

DEPARTMENT OF THE INTERIOR

ANNUAL REPORT

OF THE

TOPOGRAPHICAL SURVEYS

BRANCH

1909-1910

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OTTAWA

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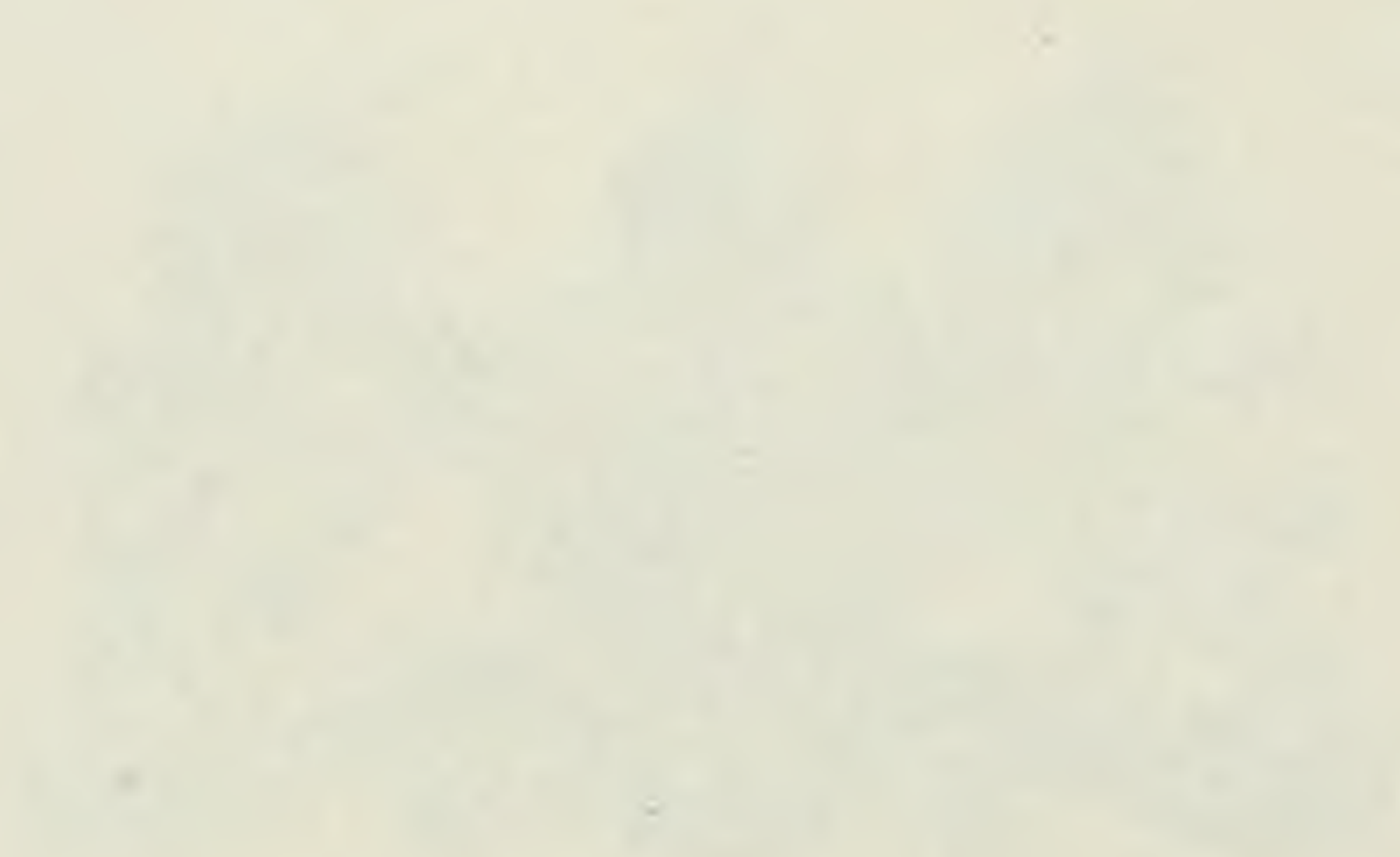
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REPORT  
OF THE  
SURVEYOR GENERAL OF DOMINION LANDS  
1909-1910

DEPARTMENT OF THE INTERIOR,  
TOPOGRAPHICAL SURVEYS BRANCH,  
OTTAWA, August 27, 1910.

The Deputy Minister of the Interior,  
Ottawa.

SIR,—I have the honour to submit the following report of the Topographical Surveys Branch for the year ended March 31, 1910.

Surveys under the Dominion Lands system are carried on by survey parties under three classes of surveyors,—(1) those employed by the day, (2) those paid at contract rates, and (3) those engaged under yearly salary. The parties under daily paid surveyors are engaged on the survey of initial meridians and base lines, on town-site and settlement surveys and on resurveys, restoration, correction and other miscellaneous work.

The survey of initial meridians and base lines is the most important work, for upon its accuracy depends the perfection of the subsequent subdivision. As a matter of course these lines are situated in outlying portions of the country, far from settlement and railway facilities and one of the greatest difficulties is that of transportation. This is in some measure obviated by having supplies freighted during the winter to depots selected in advance, thereby ensuring transportation during the course of the survey for shorter distances and with lighter loads.

Some idea of the isolation of a survey party engaged in these surveys may be obtained from the reports of one of the surveyors in charge, who states that his transport outfit required three weeks to make the round trip between his survey camp and his depot of supplies and that this depot was fifty miles from the nearest Hudson's Bay post, one hundred and twenty miles from the nearest post-office and one hundred and fifty miles from a railway station. Yet he goes on to say:—

‘It is remarkable in how short a time settlement may follow after surveys are made. Places in other parts of Alberta where a few years ago, while surveying the preliminary lines, I used to wonder how I could keep the party from starvation, are now dotted with settlements, while houses, post-offices, stores and hotels cover the country where there was no sign of human life within a hundred miles of our camp.’

Surveyors engaged on this pioneer work have peculiar advantages for gathering valuable information as to the topographical features and natural resources of large tracts of territory which, in many cases, are practically unexplored. So important a part of the surveyors' duties has this become that a leveller and an explorer are now attached to each party and they are enabled to supply data for a complete chain of levels and to furnish a report on the nature and resources of the country for a considerable distance on either side of the surveyed line. These additional duties in



no way interfere with the progress of the survey and the value of the information thus gained amply justifies the comparatively slight additional cost involved.

Subdivision surveys in the Peace river district and in western and southern Alberta were carried out by parties working under daily pay, while resurveys, restoration and correction surveys under the provisions of sections 57 and 58 of the Dominion Lands Surveys Act, were continued in the more settled districts. Several parties under similar organization were engaged in the survey of timber berths, settlements and townsites and in other miscellaneous surveys of Dominion Lands throughout the four western provinces.

Parties in charge of surveyors working under contract were employed exclusively upon the subdivision of townships into sections and quarter sections. A contract surveyor is paid at certain rates per mile of line surveyed, varying according to the difficulties of the work, from about \$7.50 per mile in level prairie to about \$31 per mile in heavily timbered country. From the rates allowed by the Department the contractors are required to meet all the expenses of survey. Twenty-six contracts were allotted during 1909, the average value of a contract being about \$12,000.

The year 1909 is memorable as witnessing the completion of the survey of the western prairies, the subdivision of the tract of land lying immediately north of the international boundary in Saskatchewan and Alberta having been completed during the year. This tract, formerly known as the semi-arid district, comprised one hundred and sixty-nine townships, and was the last piece of unsurveyed open prairie. The subdivided townships extend now in an unbroken tract from the international boundary to a considerable distance north of the Saskatchewan river and the lands not yet surveyed are all more or less wooded.

Surveys under contract were also carried on northeast and northwest of Edmonton, southeast of Prince Albert and in northern and eastern Manitoba. At Grand Prairie in the Peace river district about thirty townships were subdivided and are now open for entry.

Five inspectors of surveys are employed under yearly salary as permanent officials of the Department. It is their duty to visit the townships subdivided under contract, to examine and report upon the character of the contractors' work and to recommend its acceptance or rejection.

SURVEYS FOR THE YEAR ENDED MARCH 31, 1910.

The unusually late spring of 1909 was a help rather than a hindrance to the majority of the surveyors as it enabled them to reach their respective districts before roads and trails became impassable for heavy transport. Mr. Geo. McMillan, D.L.S., states that not in the recollection of the oldest resident had the ice remained strong in the Peace river so late in the season. It was solid until May 4, and he crossed on it at Dunvegan on May 2. Mr. A. Saint Cyr, D.L.S., who worked about one hundred miles northwest of Prince Albert reports that the spring was the most backward experienced in that locality for thirty years. Mr. E. W. Hubbell, D.L.S., with his party crossed the Saskatchewan river below Prince Albert on the ice on May 9. Mr. H. W. Selby, D.L.S., traversed the Athabaska river near the fifth meridian on the ice on May 5.

The weather generally throughout the season was unusually favourable for field operations and the amount of work accomplished compares well with that of other years. Perhaps the best basis of comparison is that of the average number of miles surveyed per party which for the last four survey seasons is as follows:—

1909.. . . . .	412 miles.
1908.. . . . .	366 “
1907.. . . . .	364 “
1906 . . . . .	305 “



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Two hundred and seventy-eight whole townships and twenty-five fractional townships were completely subdivided and a partial subdivision made of three hundred and five others. A complete resurvey or retracement was made of forty whole and three fractional townships as well as a partial resurvey in one hundred and ninety-eight others.

Sixty-four survey parties were employed, fifty-nine on township surveys and five on miscellaneous work. Of these, thirty-three were paid by the day, twenty-six worked under contract and five were engaged on the inspection of contract surveys. Four other surveyors were employed for short periods on small miscellaneous surveys. Two of the parties under daily pay worked in Manitoba, nine in Saskatchewan, fourteen in Alberta and six in British Columbia, while seven worked part of the time in one province and part of the time in another.

The parties working under contract were distributed as follows:—Three in Manitoba, eleven in Saskatchewan, eleven in Alberta and one partly in Saskatchewan and partly in Alberta.

The reports of the inspectors of surveys and of the surveyors employed under daily pay are given as appendices Nos. 11 to 45.

## SURVEYS OF BLOCK OUTLINES.

Eight surveyors were employed in establishing base lines and initial meridians. Owing to the difficulties of transportation and the nature of the country through which these lines run, the progress of the work is slow and the cost is very great. The figures which are given in Appendix No. 2 show that it varies from \$88 to \$309 per mile, and averages \$167.

Mr. A. Saint Cyr, D.L.S., continued the survey of the third meridian northerly from the north boundary of township 52 to the north boundary of township 60. He then established the sixteenth base westerly from the third to the fourth meridian. In this district valuable timber, not included in leased berths, is found in limited quantities and in widely distributed areas separated by large tracts of country which were overrun by fires years ago and where the second growth is still too small to be of any commercial value. Along the sixteenth base are many tracts of good agricultural land fit for immediate settlement. There are considerable areas of partly open and prairie land suitable for stock raising, where quantities of upland hay could be procured and where good water is found in numerous small streams.

Mr. Wm. Christie, D.L.S., established the fifteenth base easterly from the fourth to the third meridian. Sufficient governing lines between these two meridians have now been established to enable the Department to continue the subdivision of townships as far north as township 61, when a demand for these lands arises.

Mr. A. W. Ponton, D.L.S., continued the production of the fifth meridian northerly. His instructions were to extend it from township 107, where he left off in 1908, to township 117, and to run the thirtieth base westerly as far as necessary for the subdivision of the best agricultural lands in the Vermilion district. By an accident on Peace river a large part of his supplies was lost and he was compelled to return to Athabaska Landing for additional stores. Owing to the great distance from settlement and the infrequent mail service no report of his progress has yet been received.

Mr. Geo. McMillan, D.L.S., ran the eighteenth base west of the sixth meridian from the east boundary of range 9 to the British Columbia boundary. He also retraced the north boundary of township 64, range 27, west of the fifth meridian and established the seventeenth base westerly from the sixth meridian to the northeast corner of section 33, range 9. Considerable areas of this district have been devastated by forest fires and survey operations on the seventeenth base were greatly impeded by *brulé* and windfall.



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Mr. A. H. Hawkins, D.L.S., continued the fifteenth base west of the fifth meridian from the east boundary of range 25 to the sixth meridian. He also established this base west of the sixth meridian as far as the east boundary of range 9 and the sixteenth base as far as the east boundary of range 5. This district at one time was thickly covered with forests of jackpine but these are now nearly burnt off and there remains either dry standing timber or windfall. Mr. Hawkins states that the distance from market alone stands in the way of making the Muskeg and Grande Cache valleys on the fifteenth base a most admirable horse or cattle range.

Mr. B. J. Saunders, D.L.S., established the ninth base west of the fifth meridian across ranges 8, 9 and 10, and the tenth base across ranges 8, 9, 10 and 11. In township 37, range 8, a number of settlers have already located on Prairie creek where a considerable area of good hay land is found.

Mr. J. N. Wallace, D.L.S., surveyed the fourth meridian from the northeast corner of section 12, township 63, to the north boundary of township 80. Within thirty miles of his starting point the meridian crosses Primrose lake, a body of water about forty miles long and covering an area of about one hundred and ten thousand acres. The fact that this lake had not previously been shown on any map indicates the general lack of knowledge which exists regarding the topographical features of this northern country and shows the need for the exploratory work now being carried on in connection with outline surveys.

Mr. W. A. Ducker, D.L.S., was employed during the past winter in establishing the eleventh base from the east boundary of range 27, west of the principal meridian, westerly to the second meridian. This base runs through the Porcupine forest reserve and its survey was necessary in order that the limits of the reserve might be definitely marked out later on.

#### TOWNSHIP SUBDIVISION SURVEYS.

In addition to the township subdivision surveys executed under contract, several parties under daily pay were employed exclusively on subdivision in districts where contract rates would not apply.

Mr. A. McFee, D.L.S., subdivided portions of townships on the Brazeau river in which coal claims are located. The district is very mountainous and Mr. McFee was unable to complete all the surveys required.

Mr. J. B. McFarlane, D.L.S., was engaged in projecting township subdivision westerly along the line of the Grand Trunk Pacific railway from range 24, west of the fifth meridian to the Yellowhead Pass.

Mr. J. B. Saint Cyr, D.L.S., continued the subdivision of townships in the Peace river district near Dunvegan. He reports that the climate is good, with no early summer frosts and that the greater portion of the land is suitable for farming and ranching purposes. Timber for general farm use and for lumbering purposes is plentiful.

Mr. H. W. Selby, D.L.S., subdivided land east and west of Lesser Slave lake. He states that the townships lying west of Winagami lake contain as fine land as can be found within the unsurveyed portion of Dominion lands.

Messrs. W. H. Young, D.L.S., W. A. Scott, D.L.S., and Jas. Warren, D.L.S., carried on subdivision in the foothills of the Rocky mountains between Calgary and the international boundary. Some of these lands were applied for as coal and oil lands, but there is also a considerable demand from farmers and ranchers. Owing to the mountainous character of the country the progress of these surveys is very slow.

#### CORRECTION, RESTORATION AND MISCELLANEOUS SURVEYS.

Owing to the advance of settlement in recent years, townships subdivided twenty-five or thirty years ago have been largely taken up as homesteads. The wooden posts formerly used as survey monuments have disappeared, the mounds and pits have been



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destroyed and settlers are not able to locate definitely their parcels of land. As a result, farm and local improvements are delayed, friction arises between neighbours and unless restoration surveys are promptly carried out the progress of the settlement is seriously retarded.

Some of the early surveys were carelessly executed and the plans do not show the boundaries of sections as they are on the ground. In such cases where the monuments still exist and where lands affected have been patented the lines are retraced for the purpose of obtaining accurate information as to areas, bearings and distances. Had these discrepancies been discovered a few years ago, before the tide of immigration set in, the effect would not have been so serious as then the survey could have been corrected. Sometimes where the original work indicates general care and accuracy in execution a serious error has been made in the location of a survey monument. A correction is made in such cases if it can be done under the provisions of the Dominion Lands Surveys Act.

Mr. C. F. Aylsworth, D.L.S., continued resurvey work in southeastern Manitoba.

Mr. W. J. Deans, D.L.S., worked in the district between lake Manitoba and the western boundary of the province. His reports show the great necessity for restoration surveys in some localities. In one township where the original monuments were lost a settler had six acres of crop and a newly erected house on another homesteader's quarter section. In another township where extensive improvements had been made in the way of buildings two settlers were found to be on the wrong quarter sections and one was on the road allowance.

Mr. John Francis, D.L.S., was employed on resurveys in the vicinity of Yorkton, Saskatchewan. In many cases the original surveys were found to be very irregular, but settlements, roads and improvements often stood in the way of satisfactory correction.

Mr. O. Rolfson, D.L.S., carried on resurveys in southeastern Saskatchewan and in southwestern Manitoba.

Messrs. A. L. McNaughton, D.L.S., and W. R. Reilly, D.L.S., were employed in resurveying townships in the Prince Albert district, Saskatchewan.

Mr. H. S. Holcroft, D.L.S., in the early part of the season was engaged in the resurvey of townships southeast and east of Edmonton. Later he made surveys required in townships 57 and 58, ranges 9 and 10, west of the fourth meridian, which comprise what was formerly known as the St. Paul de Metis half-breed reserve. The various parcels of land allotted to half-breed claimants were marked out to enable the Department to dispose of the remainder of the old reserve to homesteaders.

The demand for small miscellaneous surveys has grown so greatly in recent years that it has been found advisable to make special provision for them. For this purpose a surveyor is employed who travels with an assistant and engages labourers and local transportation when required. This provides an expeditious and economical method of completing small surveys scattered over a wide territory, without interfering with the more extensive work being carried on by the fully organized parties. Mr. Thos. Fawcett, D.T.S., was engaged on this work and during the past season completed over forty separate surveys in Manitoba and Saskatchewan. These included the correction of errors in the original subdivision, the reestablishment of lost corners, the traverse of water areas and investigations as to the necessity for resurveys applied for.

One of the surveys carried out by Mr. Fawcett was the subdivision into sections of the land formerly covered by the waters of Reed lake along the main line of the Canadian Pacific railway west of Moosejaw. In 1883, when the adjoining land was subdivided, this lake covered an area of over eight thousand acres and the water was seven or eight feet deep. Within recent years the lake has dried up and the greater part of the land formerly covered by it is now fit for cultivation. The fertility of the soil is shown by the fact that a portion of the old lake bed produced last year over one hundred



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bushels of oats to the acre. The demands for new surveys are frequently the result of similar changes in the topographical features of the western provinces.

Mr. C. C. Fairchild, D.L.S., accompanied the commission appointed to look into the claims of Doukhobor settlers. He laid out fifty-seven village sites in Saskatchewan for these people, involving the survey of about one hundred and twenty-five miles of line.

Mr. L. R. Orde, D.L.S., made a micrometer traverse of lac LaRonge, Saskatchewan, the object of this survey being to furnish a plan for recording the mining claims located there.

Mr. W. Thibaudeau, C.E., was engaged on a reconnaissance of the head waters of the Bow river, of the Waterton river in the vicinity of Waterton lakes, of Cypress lakes and of the southern slope of the Cypress hills, with a view to locating suitable sites for the construction of storage reservoirs for irrigation and other purposes.

Messrs. Joseph Doupe, D.L.S., A. C. Garner, D.L.S., and E. W. Walker, D.L.S., were employed for short periods on resurveys in Manitoba and Saskatchewan.

#### BRITISH COLUMBIA SURVEYS.

The subdivision of Dominion lands in the railway belt, British Columbia, was carried on by four parties under Messrs. J. E. Ross, A. W. Johnson, E. W. Robinson and T. H. Plunkett, Dominion Land Surveyors. The parties were so distributed as to be available for urgent surveys wherever required.

Part of the time of Messrs. Plunkett and Robinson was taken up in surveying agricultural lands in the Columbia valley, above and below Revelstoke, which were considered to be of such value that it was deemed advisable to lay them out in parcels smaller than quarter sections. For this purpose monuments were erected as far as practicable at legal subdivision corners and in the centre of legal subdivision boundaries along the regular surveyed lines so that the land may be disposed of in parcels of such size as may be desired.

Mr. Ross was employed in the Kamloops district and Mr. Johnson in the New Westminster district. One of the surveys carried out by the latter was the subdivision into lots of a parcel of land on Bedwell bay on the north arm of Burrard inlet. This locality is easily accessible from Vancouver and New Westminster and provides exceptional advantages as a summer resort.

Messrs. S. S. McDiarmid, D.L.S., and J. H. Brownlee, D.L.S., were employed in the railway belt for short periods on work that could not be done conveniently by the regular parties.

Mr. P. A. Carson, D.L.S., continued the triangulation survey through the Selkirk mountains. An important part of his work of last year was the measurement of a base line along the Columbia river about twenty-one miles southeast of Golden. This base controls the complete network of the triangulation survey from the summit of the main range of the Rocky mountains westward to the Cascade range.

The examination and classification of the vacant lands in the valleys of the railway belt was resumed in 1909. This work was in charge of Mr. A. O. Wheeler, D.L.S. He had under his direction three sub-parties under Messrs. M. P. Bridgland, A. J. Campbell and R. D. McCaw, Dominion Land Surveyors. The country examined was classified either as fruit, farming, grazing, timber, or worthless land.

#### INSPECTION SURVEYS.

Five parties were engaged for the greater part of the time on the inspection of surveys performed under contract.

Mr. E. W. Hubbell, D.L.S., worked in the Prince Albert district. In addition to his inspection work he resurveyed five townships near Elbow, Saskatchewan. He



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speaks in very favourable terms of the district in the vicinity of Lost river, classifying it, in his opinion, as the finest section of country that is open for settlement in Saskatchewan.

Mr. P. R. A. Belanger, D.L.S., carried on inspection work in Manitoba and completed several miscellaneous resurveys.

Mr. C. F. Miles, D.L.S., inspected the contract work in the prairie section adjoining the international boundary and resurveyed several townships north of Swift Current.

Mr. G. J. Lonergan, D.L.S., completed the inspection surveys required in the district east of Edmonton. Among the other surveys executed by him the most important was the resurvey of St. Albert settlement.

Mr. L. E. Fontaine, D.L.S., inspected the contract surveys west of Edmonton.

STATEMENT OF MILEAGE SURVEYED.

The following table gives a comparison of the mileage surveyed since 1907:—

	April 1, 1909, to March 31, 1910.	April 1, 1908, to March 31, 1909.	April 1, 1907, to March 31, 1908.
	Miles.	Miles.	Miles.
Township outlines.....	2,089	2,019	1,674
Section lines.....	16,326	16,985	13,710
Traverse.....	2,413	3,323	3,193
Resurvey.....	3,876	2,175	2,917
Total for season.....	24,704	24,502	21,494
Number of parties.....	60	67	59
Average miles per party .....	412	366	364

The following tables show the mileage surveyed by the parties under daily pay and by the parties under contract:—

WORK OF PARTIES UNDER DAILY PAY.

	April 1, 1909, to March 31, 1910.	April 1, 1908, to March 31, 1909.	April 1, 1907, to March 31, 1908.
	Miles.	Miles.	Miles.
Township outlines .....	861	512	542
Section lines.....	1,066	1,004	975
Traverse.....	1,324	1,158	1,313
Resurvey.....	3,808	2,175	2,782
Total for season.....	7,059	4,849	5,612
Number of parties.....	34	36	29
Average miles per party .....	208	135	194



WORK OF PARTIES UNDER CONTRACT.

	April 1, 1909, to March 31, 1910.	April 1, 1908, to March 31, 1909.	April 1, 1907, to March 31, 1908.
	Miles.	Miles.	Miles.
Township outlines.....	1,228	1,507	1,132
Section lines.....	15,260	15,981	12,735
Traverse.....	1,089	2,165	1,880
Resurvey.....	68	.....	135
Total for season.....	17,645	19,653	15,882
Number of parties.....	26	31	30
Average miles per party.....	679	634	529

NOTE.—Owing to the nature of their work the parties under Messrs. P. A. Carson, L. E. Fontaine, A. C. Garner, S. S. McDiarmid, W. Thibaudeau, E. W. Walker and A. O. Wheeler are not included in the statement of mileage for the year ended March 31, 1910. As no returns have been received from Mr. A. W. Ponton, his party is also omitted.

COST OF SURVEYS.

The following statement shows the average cost per mile of surveys executed by surveyors under daily pay and by surveyors under contract:—

	Surveys under daily pay.	Surveys under contract.
Total mileage surveyed.....	7,059	17,645
Total cost.....	\$348,208.00	\$317,083.51
Average cost per mile.....	\$49.33	\$17.97

The low average cost of contract work, \$17.97 per mile, is due to the subdivision of 169 townships in the open prairie in southern Saskatchewan and Alberta, while nearly all the surveys under daily pay were in the woods. The average cost of daily paid surveys is raised by the base lines and initial meridians, which are very expensive. With the present organization, it is estimated that the surveys which are now being executed under contract would cost little, if any more, if they were made by parties under daily pay.

DESCRIPTIONS OF TOWNSHIPS.

Descriptions of the townships subdivided during the year have been compiled from the surveyors' reports and will be published in a separate volume. Hitherto these descriptions have been an important feature of the Annual Report, but it was becoming so lengthy that it was deemed advisable to omit them. The information which they contain, although especially valuable to land seekers and intending settlers, is of little interest to the general public and a small edition will be sufficient to meet the requirements.



## SESSIONAL PAPER No. 25b

The subdivision surveys performed prior to March 31, 1909, those made between that date and March 31, 1910, and the resurveys executed during the same period are shown in different colours upon the map which accompanies this report.

## RATE OF PAYMENT FOR TRAVERSE SURVEYS.

In order to remove doubts and causes of disagreement between survey contractors and the Department respecting the amount to be paid for traverse surveys, clause 14 of the schedule of rates of the Order in Council of May 12, 1908, was cancelled by Order in Council of December 6, 1909, and the following substituted:—

14. Traverses of lakes and rivers and connecting traverses shall be paid for at the rate of eleven dollars per mile. For traverses of lakes and rivers, the distance to be paid for shall be measured along the bank of the lake or river from every point fixed by the survey in a straight line to the next point. When both banks of a river are located from a single traverse line, the full traverse rate of eleven dollars per mile shall be paid for one bank only and the additional work for locating the other bank shall be paid for at the rate of four dollars per mile. Nothing shall be paid for offsets, but one dollar shall be deducted for every offset short of the number required by the Manual of Survey.

## MANUAL OF SURVEY.

The seventh edition of the Manual of Survey referred to in the report of last year is now in the hands of the printers and is expected to be ready soon.

## SURVEY OF TIMBER BERTHS.

Formerly timber berths were not surveyed until they had been disposed of by license. The licensee had to make his own arrangements for the survey of the berth. Last year a new method was adopted; the berths are now surveyed prior to being offered to the public. The practice is to call for tenders for the survey from surveyors in the vicinity and if the price is satisfactory instructions are issued by the Surveyor General. After the confirmation of the survey the berth is leased to the highest bidder. Instructions were issued during the year for the survey of thirteen berths.

## IRON POSTS.

Beginning in 1908, iron posts were substituted for wooden ones in marking quarter section corners. During the past year about 43,000 small iron posts were purchased for marking section and quarter section corners; large posts are used at township corners. For the convenience of surveyors posts were kept in stock at Winnipeg, Saskatoon, Edmonton, Revelstoke, Kamloops and New Westminster.

## VISIT TO DAWSON, Y.T.

The surveys in the Yukon territory are of two kinds. There are the surveys of lots and quartz mining claims for which patents are to be issued, and the surveys of placer claims, hydraulic leases, etc., which are for leases renewable from year to year. The surveys of the first kind are made under the instructions of the Surveyor General and the returns are recorded in the Department of the Interior at Ottawa. The surveys of the second kind are placed by law under the control of the Commissioner of the Yukon Territory; the returns are filed in the surveys office at Dawson and there are no duplicates anywhere else. The lack of information on these surveys was inconvenient when dealing with Yukon affairs at Ottawa; moreover, the danger of destruction by fire of that single set of records was great and the consequences



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would have been disastrous. I was accordingly directed to proceed to Dawson with two draughtsmen to examine the records of the surveys office carefully, and to make copies of such part of the records as it would be useful to have at Ottawa. This work has been successfully accomplished.

While at Dawson I devoted considerable attention to the arrangements in force for the surveys in the Territory and on my return submitted various recommendations for the improvement of the service.

## CORRESPONDENCE.

The correspondence of this Branch consisted of:—

Letters received.. . . .	15,368
Letters sent.. . . .	14,130

## ACCOUNTS.

The Accountant's record shows:—

Number of accounts dealt with.. . . .	764
Amount of accounts.. . . .	\$898,536
Number of cheques forwarded.. . . .	3,584

## OFFICE STAFF.

Under the new organization of the Department of the Interior, the Geographer's and Survey Records' offices, which formerly were part of the Topographical Surveys Branch, are now separate branches: they have accordingly been omitted from the list of employees in Appendix No. 9.

The office staff of the Topographical Surveys Branch proper consists of one hundred and twenty-seven employees. There are fourteen vacancies.

Messrs. J. B. Lepage and M. J. McLaughlin resigned during the year. Mr. C. R. Binks was transferred to the Accounts Branch, Mr. M. B. Bonnell to the Department of Agriculture, Mr. T. H. G. Clunn to the Dominion Astronomical Observatory and Mr. R. S. Stronach to the Railway and Swamp Lands Branch.

Two members of the staff died, Messrs. Wm. Elwell and W. T. Green. Mr. Elwell was a graduate of the School of Practical Science, Toronto, and Mr. Green an honour graduate of the University of Toronto and a Dominion Land Surveyor. Both were possessed of a high order of ability and by their untimely deaths the public service suffered a serious loss.

The following new members were appointed:—J. F. Blanchard, J. D. Bradley, D. E. Chartrand, B.Sc., J. A. Cote, A. Cousineau, L. O. R. Dozois, J. F. Fredette, C. M. Hoar, B.Sc., W. J. Lytle and C. E. Marchand. Mr. H. M. Easton was engaged as a printer and Mr. E. H. Hare was employed temporarily as assistant photographer.

## CHIEF DRAUGHTSMAN'S OFFICE.

*(P. B. Symes, Chief Draughtsman.)*

The chief feature of the past twelve months in the office has been the steady increase in the amount of business to be attended to and the increasing difficulty in handling it with a staff diminished in numbers and impaired in efficiency by the loss of experienced men. Not only has there been an increase in almost every item, as may be seen from statements below, but new lines of work have been added, such as levelling and magnetic observations, which necessarily occupy some of the available force in the office.

The new section of the draughting office established chiefly to deal with these and other scientific matters, such as astronomical tables, &c., was put into working order during the year and has now a staff of eight.



## SESSIONAL PAPER No. 25b

The demand for maps and plans and other printed matter is becoming greater every year and probably it will not be long before some better provision must be made for this distribution work.

## CHIEF DRAUGHTSMAN'S OFFICE—FIRST SECTION—SURVEY INSTRUCTIONS AND GENERAL INFORMATION.

*(T. E. Brown, Chief of Section.)*

The work of this section has increased steadily during the year, whereas the strength of the staff has been reduced from twenty-one to nineteen. For this reason the general report of survey operations mentioned in last year's report, as well as the history of photo-topographical survey operations in the Rocky mountains have had to be laid aside and are not yet ready for publication.

One hundred and ninety-two drafts of instructions to surveyors for the execution of surveys were prepared. These instructions were accompanied in each case with all the information available as to the nature of the country, the previous surveys of Dominion lands, Indian reserves, trails, &c.; 1,274 sketches and 103 maps and tracings were compiled and furnished for this purpose.

Entries in the office registers show that 1,214 progress sketches were received from surveyors, together with 547 books of field notes for township surveys, 132 books and 568 plans, sketches, &c., for miscellaneous surveys, 451 timber reports, 383 statutory declarations of settlers and returns for 1,037 magnetic observations and for 128 separate blocks of timber berths. General reports on their survey operations were received from thirty-five surveyors.

Their examination having been completed, 725 books of field notes were placed on record, together with 430 plans of miscellaneous surveys and 383 statutory declarations of settlers.

Plans of 705 townships, 5 settlements or townsites, 54 sectional maps and 113 miscellaneous plans were received from the lithographic office, entered in the registers and distributed.

Preliminary plans were issued for 424 townships.

Fifteen hundred and five communications from settlers and others on various subjects, and inquiries from other branches were received and dealt with; they required the preparation of 1,250 sketches, 153 maps and tracings and the copying of 288 pages of field notes. Twelve descriptions of parcels of land were drafted.

The compilation of a set of maps to illustrate discrepancies in the surveys and to show closings of township surveys has been continued. Fourteen new sheets have been made and twenty-two revised and brought up to date.

Considerable time was devoted to proof-reading the new edition of the Manual of Instructions for the Survey of Dominion Lands, the Annual Report of the Branch, a pamphlet on 'Descriptions for Deeds' and other reports, forms, &c., printed during the year.

Two thousand, one hundred and ninety-one files were received from the Correspondence Branch and used in connection with the work of this office. Four thousand five hundred and five draft letters and memoranda were written.

## CHIEF DRAUGHTSMAN'S OFFICE—SECOND SECTION—SURVEYS IN MANITOBA, SASKATCHEWAN AND ALBERTA.

*(T. S. Nash—Chief of Section.)*

The staff of this section is much smaller than previously. At the time of reorganization in September, 1908, twenty-eight employees were considered necessary



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for the work of the section. At the beginning of the year the staff was three men short. During the year five men were removed and one was added. The average shortage for the year has been six employees.

As stated in previous reports, all the returns of surveys of Dominion Lands in the provinces of Manitoba, Saskatchewan and Alberta are examined in this section and plans of the surveys compiled.

Sketches sent in by surveyors in the field showing the progress of the work are examined to see that all the surveys are correctly executed within the limits of error allowed by the Manual and that all areas made fractional by water are shown. These sketches are the basis for the advances to contractors. During the year 404 progress sketches from surveyors employed by the day, 441 from contractors and 203 from inspectors were received and examined, making a total of 1,048.

Immediately upon being received, the final returns are given a cursory examination, the purpose of which is to detect any serious omissions or discrepancies, and if necessary, they are returned to the surveyor for correction. After this the returns of all previous surveys in the township or settlement are collected and the compiling of the plan is proceeded with. During the year 378 subdivision surveys, 247 township outline surveys and 144 miscellaneous surveys were examined and the compiled plans of 660 townships were sent to the draughtsmen to be drawn for reproduction. This number includes the first edition of plans of 388 townships which shows the extent of new country being opened up for settlement. Compiled plans of 12 miscellaneous surveys were also sent to the draughtsmen. While compiling, a very careful examination is made of the returns of the new survey and a memorandum of any discrepancies or omissions is sent to the surveyor. Five hundred and twenty such memoranda were sent while 450 replies to memoranda were received and the necessary corrections made in the field books; 1,150 letters in connection with the work were drafted.

The field notes of the inspectors of surveys in examining survey contracts also are examined and their reports dealt with in this section.

The survey contracts given out each year are examined by five surveyors who are employed throughout the year by the Department. Each inspector has to examine a number of contracts situated in the same section of the country. It is his duty to survey a few miles of line in each of several townships in each survey contract as soon as possible after the contractor has completed his work and to send to the Department the same information in connection with the survey of the lines examined which the contractor is expected to furnish. He further makes a report on the general appearance of the survey and recommends to the Surveyor General the acceptance or the rejection of the contractor's work.

The inspector's notes are examined and compared with the contractor's. If this comparison reveals a close agreement between the two and if the inspector's general report is favourable the contractor's work is accepted by the Department and he is paid in full. If the inspector's field notes or report show that the survey, or any part of it, has been too imperfectly performed to be accepted, the contractor is required to correct his work. If the defects discovered show that the survey was not performed strictly in accordance with the terms of the contract, but the defects are not of such a nature as to cause the rejection of the work, the contract is accepted subject to deductions recommended by the inspector or provided for by the Manual of Surveys. In all such cases, however, the contractor is given the option of either accepting the deduction in his account or of correcting his work.

This system of inspection of contract surveys which has been in use for the past six years has resulted in a much higher standard of work by the survey contractors than was formerly obtained. Also it prevents the occurrence of large errors and thus obviates the necessity for making corrections at some later date. During the year the inspec-



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tors' reports on thirty-four contracts were received and dealt with and thirty-eight contract accounts were closed.

One hundred and forty-seven requests for information concerning surveys were received from other branches of the Department involving the calculation of 710 areas; 265 plans of road diversions made by the provincial governments of Saskatchewan and Alberta were examined.

In this section also were examined the plans and field notes for sixty-four timber berths consisting of 212 blocks; and thirty-four plans of right of way of railways were examined, the mileage of which amounted to 794.09. Many of the right of way plans being in duplicate or in triplicate, the gross mileage of plans examined was 1,889.25.

### CHIEF DRAUGHTSMAN'S OFFICE—THIRD SECTION—DRAWING FOR REPRODUCTION.

*(C. Engler, Chief of Section.)*

The nominal strength of the staff in this section is thirteen, but this has not been maintained except during the latter part of March, when the vacancy recorded in the last annual report was filled by the appointment of Mr. C. E. Marchand.

The staff still occupy part of the second floor of the Imperial building, Queen street. These quarters have been found very comfortable and well suited for draughting, but on account of their situation, are not very convenient. It frequently happens that in planning the publication of a map details as to photographing have to be discussed with the photographer, and as to printing with the lithographers or pressmen. The photographer is on the top floor of the Topographical Surveys building, the pressmen and some of the lithographers are in the basement of the same building, while others are in the basement of the Imperial building. Time is therefore lost in going from one to another. The arrangement is also bad for the expeditious reading of proofs.

The hand printing press used in this section was originally intended for printing titles, names, &c., for pasting on plans to be photo-zincographed. Very frequently the office work of the other divisions requires the printing of forms for office use, circular letters to surveyors, amendments to the Manual of Surveys, &c. Many of these are printed on the hand press, for as a rule only a limited number is required and the amount of typesetting is small. As hinted at in the last report, the work of printing has become more than one man can do; accordingly a pressman from the lithographic office has been employed to operate the press. As time goes on the number of ways in which type can be adapted for use in making plans increases until now some of the most complicated plans are made altogether from type and a comparison of them with plans drawn in the ordinary way shows an improvement in most cases. It might be remarked that type lends itself to use in plans especially where straight lines predominate as, for example, in plans of townsites, while on the other hand where letters are to be arranged in curves it is hard to make type letters look well.

The number of township plans prepared for printing during the year was 713, an increase of about 16 per cent over the number prepared last year. These plans represent an area considerably larger than the combined areas of Nova Scotia and Prince Edward Island.

The number of other plans, drawings and miscellaneous jobs amounted to 182. Some of the more important are the plans of the town of Churchill and specimen plans for the revised Manual of Surveys. Considerable work has also been done on profiles of base lines to be published later, and on the maps and plans to accompany the Annual Report of this Branch.



CHIEF DRAUGHTSMAN'S OFFICE—FOURTH SECTION—BRITISH COLUMBIA SURVEYS.

(*E. L. Rowan-Legg, Chief of Section.*)

In this section the usual work of examination of surveyors' field notes has been carried on, and township plans have been compiled. In the case of townships in which the amount of information required to be shown is very great it becomes necessary to compile quarter township plans on a larger scale, so that the details may be clearly seen.

Besides township plans, a plan of the townsite of Golden (South) was compiled and issued.

Plans of the townsites of Yale and Golden have also been compiled, but have not yet been issued.

The compilation of the plan of Golden was delayed for a considerable length of time on account of the difficulty experienced in the field in finding a suitable road connection between the town and its extension, but this was at last satisfactorily arranged.

A large number of plans and field notes of the survey of timber berths has been examined for the Timber, Grazing and Irrigation Branch, in order that the berths may be dealt with as soon as possible. This work entails not only the examination of the returns, but also their reexamination when sent back by the surveyor after the corrections are made. Two of the members of the staff were engaged on this work.

Considerable time was spent by several members of the staff in copying maps for the Department in connection with the surveys to be made of agricultural lands about Shuswap lake and in the Columbia valley.

The work of this section consisted of:—

Preliminary plans issued.. . . .	43
Township plans compiled.. . . .	119
Townsite plans compiled.. . . .	3
Plans and sketches made.. . . .	344
Returns of township subdivision examined—books.. . . .	40
“ “ “ “ —plots.. . . .	57
Returns of timber berths examined.. . . .	101
Returns of miscellaneous surveys examined.. . . .	4
Returns of mineral claims examined.. . . .	7
Odd jobs and requests for various information dealt with.. . .	722
Draft letters and memoranda written.. . . .	1,067

CHIEF DRAUGHTSMAN'S OFFICE—FIFTH SECTION—MAPPING.

(*J. Smith, Chief of Section.*)

Since the last report the staff of the section has been reduced from eleven to nine, Mr. Genest having been transferred temporarily to Dawson and Mr. Lepage having resigned.

The routine work on the sectional maps has been continued, eleven of the maps on a scale of three miles to an inch and thirty-nine of those on a scale of six miles to an inch being revised and re-issued. In addition to the above, sixty-eight of the larger maps were revised and the work copied on the smaller maps for the Railway Lands Branch.

In connection with the work on the sectional maps, the following documents were used, viz.:—seventy-five plans of timber berths, three plans of Indian reserves, four hundred and twenty-six plans of surveyed roads, sixty-eight plans of railways and five hundred and twelve field books; the names and positions of one thousand and fifty-eight post-offices, mostly new ones, were obtained from the Post-Office Department and put on the maps, one hundred and forty-seven sectional maps were examined and three hundred and fifty-six letters and memoranda written.



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The work on the Yukon surveys is falling in arrears because the staff is insufficient for the work; of the ninety-nine returns of surveys received, only thirty-eight have been examined and thirty-one plans reduced and plotted on the group plans. More assistance is urgently needed in this work.

## CHIEF DRAUGHTSMAN'S OFFICE—SIXTH SECTION—SCIENTIFIC AND TOPOGRAPHICAL WORK.

*(G. Blanchard Dodge, Chief of Section.)*

The staff of this section consists at present of six technical men and one non-technical, but as some appointments have only recently been made the staff practically has consisted of only four men for the past year. There are still five vacancies.

This section takes entire charge of the level and magnetic work.

The instructions for levels are prepared, level notes checked and profiles plotted. The total number of miles of levels (spirit and trigonometric) run to date is 854; checked and profiles plotted, 506. Reduced profiles of some of the base lines, of part of the Yukon-British Columbia boundary and of the streets of Churchill are appended. The relief of the country is already an important matter in southern Alberta and as the country develops and becomes more thickly settled, will engage attention throughout the whole west. Large areas of swamp now regarded as practically useless may be drained and prove fine agricultural land. One surveyor writes: 'The taking of levels has shown the fallacy of thinking there would be much difficulty in drainage. We have crossed large areas of swamp fifty or a hundred feet higher than streams within a couple of miles. It is not want of fall, but want of outlet, that causes nearly all swamps and bogs.'

In 1907, Mr. A. Saint Cyr, D.L.S., was requested to take frequent aneroid readings during the course of his survey, the object being to see what reliability could be placed on elevations derived from aneroid readings carefully taken. The barometer reading at sea-level for the place of observation is taken from the daily isobar maps published by the Meteorological Service and the altitudes calculated. At the time it was thought that accuracy could not be hoped for and that the resulting elevations would be too unreliable to be made use of. On the contrary, the results have been very encouraging, so much so that this year (1910) as a further experiment, surveyors running levels have been requested to take frequent aneroid readings conjointly with the levels. If these prove equally satisfactory, they will furnish us with close approximations of the true elevations for the different level lines until opportunity offers to connect with railway surveys.

Instructions are prepared for magnetic observations, compasses of surveyors' transits examined, tested and the index correction determined, the returns of observations checked, the information compiled and prepared in form to be of practical use. The number of observations for magnetic declination received for the past year is 1,037. Observations were taken by 27 surveyors.

Eighty-seven letters of instructions to surveyors were prepared, 232 other letters drafted and 174 letters received.

The testing of surveyors' instruments comes under this section. This work is at present much handicapped by want of proper accommodation and proper facilities. Three of the new block survey transits were examined, tested and their constants determined. The telescopes of these transits are exceptionally good, the definition being very fine. No difficulty was experienced in getting good pointings on stars listed in star catalogues as 6.7 and 6.8 magnitudes. A latitude determination by Talcott's method gave a probable error of 0".20 from 29 pairs of stars. This is considered remarkably good with an instrument of the size. Other instruments were also tested.



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Whenever time permits, the surveyors' watches sent in to be cleaned and rated are sent to the makers, but sometimes there is not sufficient time for that and surveyors leave their watches to be rated here. Eight watches were rated for the past year.

This section has charge of all the instruments owned by the Branch and the repairs to instruments.

During the past year the chapter on 'Block and Base line Surveys' and the appendices on 'The Determination of the Astronomical Meridian,' 'The Determination of the Magnetic Meridian' and 'Instruments' for the new edition of the Manual of Surveys and a new book for 'Record of Azimuth Observations' were revised or prepared.

The Astronomical Field Tables for twelve months and a projection for a new map of Canada were computed. Numerous other miscellaneous computations required were also made.

Twenty-five township plans were compiled.

Under this section comes the plotting and putting into shape for publication the topographical information supplied by surveyors. The present staff is only about sufficient to handle the level, magnetic and other work enumerated above, and if anything worth while is to be done in that line all five of the existing vacancies will require to be filled.

#### PHOTOGRAPHIC OFFICE.

A new frame for hanging the copying camera and copying board has been installed; it is perfectly rigid and provided with means of adjustment both for the copying board and for the camera. A new graduation has been made for setting the focus to enlarge or reduce to any scale: it is very accurate.

Photo-zincographs in colours are now made from a single negative from which as many zinc transfers are made as there are colours to be printed. For each transfer, all the lines which must not show are painted out on the negative and after the transfer is made, the paint is washed off. The process is repeated for each colour. All the transfers being made from one negative, perfect registration is obtained.

There were 196 wet plate negatives and 118 photo-zinc transfers more than last year.

It is of interest to calculate the value of the work of the Process Photographer on a commercial basis. The photo-zinc transfers made during the year amounted to 190,080 square inches; the current rate being six cents per inch, this represents a value of \$11,404.80. Wet plate negatives made for purposes other than lithography have a value of about \$800. The total value is \$12,204.80. The cost in salaries, chemicals, electric current, graining of plates, interest on plant and rent was \$5,351.40, leaving a net profit on the operations of \$6,853.40. The process photographer is unfortunately at a great disadvantage for lack of room: the copying camera can take plates 24" x 32", but the dark rooms are so small and crowded that it is next to impossible to handle plates of that size.

The work of the Chief Photographer has also steadily increased, especially in Vandyke printing, of which the quantity has nearly trebled. Of lantern transparencies, twice as many were made as in the previous year. These slides are for lecturing in Europe in connection with the immigration business of the Department, and they are made chiefly from the Chief Photographer's negatives, who visited for that purpose, during the summer, the Pacific Coast, the Okanagan valley in British Columbia, and the great wheat and ranching districts of Manitoba, Saskatchewan and Alberta. He brought back about 250 excellent negatives illustrating the salmon fisheries, the great orchards of British Columbia, the harvesting operations and other subjects of interest.



## SESSIONAL PAPER No. 25b

## BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

*(F. D. Henderson—Secretary.)*

The Board of Examiners for Dominion Land Surveyors had two meetings. The first one was a special meeting lasting from April 30 to May 31 (inclusive) 1909, during which examinations were held at Ottawa, Montreal, Toronto, Winnipeg, Calgary and Edmonton. The second one was the regular annual meeting called for by Section 9 of the Dominion Lands Surveys Act. It began on "the second Monday" in February, (February 14, 1910) and lasted until March 31, 1910 (inclusive). During this meeting examinations were held at Ottawa, Halifax, Montreal, Kingston, Toronto, Winnipeg, Calgary, Edmonton and Vancouver.

At the special meeting of the Board in April and May, 1909, 111 candidates presented themselves for the full preliminary examination, 15 for the limited preliminary, and 30 for the final, a total of 156 candidates.

At the regular annual meeting in February and March, 1910, there were 145 candidates for the full preliminary examination, 18 for the limited preliminary, 42 for the final and one for a certificate as Dominion Topographical Surveyor.

Out of the 289 preliminary candidates, 97 or one-third, were admitted: of the 72 candidates at the final examination, 37, or one-half were successful and were granted commissions as Dominion Land Surveyors. The total number of candidates examined was 362, against 279 in 1908-09, and 161 in 1907-08.

The successful candidates were as follows:—

## PRELIMINARY EXAMINATION.

Allwood, Frank Harold, Spanish Town, Jamaica.	Harris, Ley Edwards, Midnapore, Alta.
Barton, Harold Maill, Ottawa, Ont.	Harrison, Edward W., Ottawa, Ont.
Bastien, L. A., Ottawa, Ont.	Hicks, C. J., Edmonton, Alta.
Bartley, Thomas H., Toronto, Ont.	Humbert, Adrien, Innisfail, Alta.
Bate, Charles Benjamin, Ottawa, Ont.	Hunter, A. Ernest, Wiarton, Ont.
Brennan, Martin John, Ottawa, Ont.	Hunter, Alexander Neil, Toronto, Ont.
Brown, Milton, Kitscoty, Alta.	Johnston, Charles Ernest, Toronto, Ontario.
Carthew, John Trewalla, Edmonton, Alta.	Johnston, Harold Chapman, Toronto, Ont.
Chartrand, Lonat Emile, Ottawa, Ont.	Johnston, Charles, Parry Sound, Ontario.
Clarke, Alfred Carleton, Regina, Sask.	Johnston, William James, St. Catharines, Ont.
Clerke, Alexander Wilberforce, Toronto, Ont.	Johnston, James Homer, Cottam, Ont.
Collinson, John Gordon, St. Thomas, Ont.	Jones, Louis Elgin, Toronto, Ont.
Colquhoun, G. Allan, Vankleek Hill, Ont.	Kendall, Leslie Evans, Ottawa, Ont.
Cook, Arnold Blair, Taber, Alta.	Keys, Herbert J. E., Sault Ste. Marie, Ont.
Côté, Joseph Martial, Ottawa, Ont.	Kingstone, George Alexander, Toronto, Ont.
Coumans, Oliver, Chepstow, Ont.	Lamb, Frederick Carlyle, Walkerton, Ont.
Davidson, Douglas, Port Rowan, Ont.	Lindsay, James Herbert, Hornby, Ont.
Dodd, George Saville, Kingston, Ont.	Logan, Robert Archibald, Middle Musquodoboit, N.S.
Doze, Joseph Wilbert, Fort Saskatchewan, Alta.	Macdonald, Colin Stone, Ottawa, Ont.
Dozois, Leo Oswald Ross, Ottawa, Ont.	Macdonald, James Atwood, Ridgetown, Ont.
Draper, Walter Harold, Edmonton, Alta.	Macdonald, Jeremiah James, Vernon River, P.E.I.
Earle, Wallace Sinclair, Picton, Ont.	Mackay, Ernest George, Hamilton, Ont.
Edwards, William Muir, Strathcona, Alta.	MacLennan, George Gordon, Toronto, Ont.
Ellis, Douglas Stewart, Kingston, Ont.	MacRostie, Norman Barry, Metcalfe, Ont.
Ewan, Hedley Jenkins, Yarmouth, N.S.	McArthur, Alexander Stanley, Toronto, Ont.
Ewing, Ernest Olliphant, Toronto, Ont.	McElhanney, Thomas Andrew, Toronto, Ont.
Ferguson, John Binning, Kenora, Ont.	McEwan, Duncan Findlay, Vancouver, B.C.
Fife, Walter Maxwell, Edmonton, Alta.	McLaren, Arthur Anthony, Mitchell, Ont.
Fletcher, Arthur William, Thornton, Ont.	McLennan, R. A., Toronto, Ont.
Fox, Charles Harry, Winnipeg, Man.	Manson, A. Brock, Fairview, Ont.
Galletly, James Simpson, Brooklin, Ont.	Markle, Gower Ambrose, Kingston, Ont.
Gemmill, John Alexander Ogilvie, Ottawa, Ont.	Marr, Norman, London, Ont.
Gorman, Arthur O., Buckingham, Que.	Mowbray, F. E. H., Hamilton, Ont.
Grant, Alexander Macdonald, Ottawa, Ont.	Moyer, John Curtis, St. Catharines, Ont.
Greene, Gerald Elliott Denbigh, Toronto, Ont.	Nesham, Edward Williams, Ottawa, Ont.
Harper, Clarence J., Orangeville, Ont.	Novion, Lucien, Edmonton, Alta.
	Openshaw, John Edward, Montreal, Que.



PRELIMINARY EXAMINATION—*Continued.*

Pae, Arthur Wilson, Barrie, Ont.	Slater, Nicholas James, Ottawa, Ont.
Parry, Harry, Westmount, Que.	Smith, Leonard Ross, Calgary, Alta.
Patterson, John Herbert, Kinosota, Man.	Sproule, Stanley Macquana, Montreal, Que.
Pearson, Hugh Edwards, Edmonton, Alta.	Staveley, Walter Darley, Montreal, Que.
Pierce, Clifford Benjamin, Kingston, Ont.	Steers, Frank P., Ottawa, Ont.
Pinder, George Zouch, Edmonton, Alta.	Stitt, Ormand Montgomery, Ottawa, Ont.
Pye, David E., Arnprior, Ont.	Thornley, J. Harry, London, Ont.
Raley, George Simpson, Lethbridge, Alta.	Tipper, George Adrian, Brantford, Ont.
Reid, John, Winnipeg, Man.	Toms, Charles Godfrey, Toronto, Ontario.
Robertson, John Alexander Thompson, St. Catharines, Ont.	Webb, Christopher Everest, Toronto, Ont.
Roe, Allan John Forbes, Ottawa, Ont.	Willis, George Christopher, Toronto, Ont.
Segre, Beresford Henry, Winnipeg, Man.	Wright, Alfred Esten, Golden, B.C.

## FINAL EXAMINATION.

Akins, James Robert, Ottawa, Ont.	Harrison, Edward, Belleville, Ontario.
Allison, Calvin Bruce, South Woodslee, Ont.	Heaman, John Andrew, Winnipeg, Man.
Begg, William Arthur, Hamilton, Ont.	Herriot, George Henry, Kingston, Ont.
Belyea, Albert Palmer Corey, Edmonton, Alta.	Heuperman, Frederick Justinus, Edmonton, Alta.
Blanchet, Guy Houghton, Ottawa, Ont.	Lighthall, Abram, Vankleek Hill, Ont.
Brenot, Lucien, Ottawa, Ont.	McGeorge, William Graham, Chatham, Ont.
Broughton, George Henry, Vancouver, B.C.	Peters, Frederick Hatheway, Ottawa, Ont.
Brown, Charles Dudley, Winnipeg, Man.	Phillips, Harold Geoffrey, Saskatoon, Sask.
Brown, Thomas Wood, Edmonton, Alta.	Pierce, John Wesley, Kingston, Ont.
Carthew, William Morden, Edmonton, Alta.	Purser, Ralph Clinton, Windsor, Ont.
Clarke, Charles Wentworth, Regina, Sask.	Reid, Frederick Blair, Ottawa, Ont.
Cokely, Leroy S., Coaldale, Alta.	Robertson, Donald Fraser, Ottawa, Ont.
De la Condamine, Oscar Charles, High River, Alta.	Sheppard, Albert Campbell Tremain, Ottawa, Ont.
Edwards, William Milton, Iroquois, Ont.	Smith, Donald Alpine, Claude, Ont.
Ferguson, George Hendry, Toronto, Ont.	Stewart, Lionel Douglas Noble, Collingwood, Ont.
Graham, John Robertson, Ottawa, Ont.	Stewart, Alexander George, Ottawa, Ont.
Greene, Philip Weston, Toronto, Ont.	Street, Paul Bishop, Toronto, Ont.
Hamilton, James Frederick, Lethbridge, Alta.	Stock, James Joseph, Ottawa, Ont.
Hannon, Robert Maitland, deceased.	

Besides the reading of the candidates' answers to the examination papers, the Board had to investigate the services of pupils under articles as shown by the affidavits, their diplomas from universities or technical colleges, the commissions of Provincial Land Surveyors and other evidence submitted by candidates as to their eligibility for examination. Full sets of examination papers were prepared at both meetings.

At the meeting of May, 1909, it was decided to allow candidates who have passed the final examination as Ontario Land Surveyors, but whose commissions as such are being withheld pending the completion of their service as Ontario pupils under articles, the privilege already granted to Dominion pupils of coming up for final examination if their time of service is within three weeks of completion.

Oaths of office and allegiance and bonds for the sum of one thousand dollars each as required by section 25 of the Act, were received from, and commissions as Dominion Land Surveyors issued to thirty-three surveyors.

Every Dominion Land Surveyor is required to be in possession of a subsidiary standard of length (D.L.S. Act, section 35). Seventeen new standards were issued by the Secretary, and one was re-tested. A list of the surveyors who have been furnished with standard measures up to March 31, 1910, will be found in Appendix No. 10.

The correspondence of the Board was as follows:—

Letters received. . . . .	1,701
Letters sent. . . . .	931
Circular letters, pamphlets and parcels sent. . . . .	1,371



SESSIONAL PAPER No. 25b

## APPENDICES.

The following schedules and statements are appended:—

No. 1. Schedule of surveyors employed and work executed by them from April 1, 1909, to March 31, 1910.

No. 2. Schedule showing for each surveyor employed from April 1, 1909, to March 31, 1910, the number of miles surveyed, of township section lines, township outlines, traverses of lakes and rivers and resurvey; also the cost of the same.

No. 3. List of lots in the Yukon Territory, surveys of which have been received from April 1, 1909, to March 31, 1910.

No. 4. List of miscellaneous surveys in the Yukon Territory returns of which have been received from April 1, 1909, to March 31, 1910.

No. 5. Statement of work executed in the office of the chief draughtsman.

No. 6. List of new editions of sectional maps issued from April 1, 1909, to March 31, 1910.

No. 7. Statement of work executed in the photographic office from April 1, 1909, to March 31, 1910.

No. 8. Statement of work executed in the lithographic office from April 1, 1909, to March 31, 1910.

No. 9. List of employees of the Topographical Surveys Branch at Ottawa, giving the name, classification, duties of office and salary of each.

No. 10. List of Dominion Land Surveyors who have been supplied with standard measures.

Nos. 11 to 45. Reports of surveyors employed.

## MAPS AND PROFILES.

The following maps and profiles accompany this report:—

Map showing subdivision surveys and resurveys made from April 1, 1909, to March 31, 1910.

Maps to accompany reports of surveyors:

Profile of streets and avenues of Fort Churchill.

Profiles of certain base lines.

Profile of part of the British Columbia-Yukon Territory boundary.

I have the honour to be, sir,

Your obedient servant,

E. DEVILLE,  
*Surveyor General.*







# TOPOGRAPHICAL SURVEYS BRANCH

## SCHEDULES AND STATEMENTS.

### APPENDIX No. 1.

SCHEDULE of Surveyors employed and work executed by them from April 1, 1909, to March 31, 1910.

Surveyor.	Address.	Description of Work.
Aylsworth, C. F.. . .	Madoc, Ont.. . . .	Investigation of dispute in township 12, range 7, east of the principal meridian; resurvey of township 15, range 3, township 9, range 10, and township 8, range 13, west of the principal meridian; traverse of Assiniboine river through townships 9, ranges 10 and 11, townships 8 and 9, range 13, and township 8, range 14, west of the principal meridian.
Baker, J. C.. . . .	Vermilion, Alta.. . . .	Contract No. 25 of 1909. Subdivision of the southerly two-thirds of townships 54, ranges 17, 18, 19 and 20, west of the fifth meridian.
Bélanger, P. R. A.. .	Ottawa, Ont.. . . .	Destruction of monuments along the Colonization road in townships 18, 19 and 20, range 1; subdivision in township 31, range 17, townships 32 and 35, range 18, and township 33, range 19; all west of the principal meridian. Survey of villa lots and resurvey at Grand Marais point in township 18, range 7, east of the principal meridian and retracement in Fairford and Pine Creek settlements. Traverse of Winnipeg river in township 18, range 11, east of the principal meridian. Inspection of contracts Nos. 33 of 1907, 5, 24, 29 and 30 of 1908, and Nos. 6 and 12 of 1909; re-inspection of contracts Nos. 32 of 1907 and 17 of 1908; inspection of mounding in contract No. 9 of 1906.
Bolton, L.. . . .	Listowel, Ont.. . . .	Contract No. 13 of 1909. Subdivision of townships 42 and 43, ranges 7 and 8, west of the second meridian.
Brownlee, J. H.. . .	Vancouver, B.C... .	Subdivision and resurvey in townships 12 and 15, east of the coast meridian.
Carson, P. A... . .	Ottawa, Ont.. . . .	Triangulation surveys in British Columbia in connection with the Trigonometrical Section of the Topographical Survey of Canada.
Cautley, R. H.. . .	Edmonton, Alta.. . .	Contract No. 7 of 1909. Subdivision of townships 1, 2, 3 and 4, ranges 14 and 15, and townships 1, 2 and 3, ranges 16, 17, 18, 19 and 20; part resurvey of township 4, range 18, all west of the third meridian.



APPENDIX No. 1—Continued.

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—Continued.

Surveyor.	Address.	Description of Work.
Chilver, C. A... ..	Walkerville, Ont.....	Contract No. 11 of 1909. Subdivision of townships 1, 2, 3 and 4, ranges 5, 6, 7, 8, 9 and 10, all west of the third meridian.
Christie, W... ..	Prince Albert, Sask...	Survey of the fifteenth base line from the third to the fourth meridian.
Cote, J. L... ..	Edmonton, Alta... ..	Contract No. 15 of 1909. Subdivision of townships 1, ranges 7, 8, 9, 10, 11, 14, 17, 18, 19 and 20, townships 3, 4, 5, 6, 7 and 8, ranges 10 and 11, and township 4, range 12, all west of the fourth meridian.
Davies, T. A... ..	Edmonton, Alta... ..	Contract No. 2 of 1909. Subdivision of townships 56, 57 and 58, ranges 1 and 2, and townships 57 and 58, ranges 3 and 4, all west of the fourth meridian.
Deans, W. J... ..	Brandon, Man... ..	Resurvey of township 16, range 9; correction survey in township 24, range 30; retracement of township 20, range 12; retracement and restoration survey in township 16, range 8, township 17, range 10, and in township 20, range 13, all west of the principal meridian
Doupe, Jos... ..	(Deceased)... ..	Resurvey in township 13, range 6, townships 13 and 14, range 7 and township 14, range 8, west of the principal meridian.
Ducker, W. A... ..	Winnipeg, Man... ..	Survey of the eleventh base line from the northeast corner of township 40, range 26, west of the principal meridian to the second meridian.
Edwards, Geo... ..	Ponoka, Alta... ..	Contract No. 16 of 1909. Subdivision of township 47, range 5, and townships 47 and 48, range 6 and township 48, range 7, all west of the fifth meridian.
Fairchild, C. C... ..	Brantford, Ont... ..	Survey of fifty-seven Doukhobor villages in the province of Saskatchewan; miscellaneous surveys in townships 44 and 45, range 5, township 44, range 6, townships 42 and 41, range 7, townships 39 and 44, range 8, and township 39, range 9, all west of the third meridian.
Farncomb, A. E... ..	Lacombe, Alta... ..	Contract No. 23 of 1909. Subdivision of townships 37 and 38, ranges 8 and 9, and township 39, range 8; survey of the east outlines of township 40, range 9, and townships 39 and 40, range 10, all west of the fifth meridian.
Fawcett, Thos... ..	Niagara Falls, Ont....	Miscellaneous surveys in township 19, range 21, township 20, range 23, townships 25, ranges 27 and 28, townships 17 and 20, range 29, and townships 17 and 18, range 30, all west of the principal meridian. Miscellaneous surveys in townships 20 and 21, ranges 3 and 4, townships 21 and 28, range 5, townships 22 and 28, range 6, township 20, range 7, townships 19, 20 and 21, range 8, townships 23, 32 and 33, range 9, township



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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—*Continued.*

Surveyor.	Address.	Description of Work.
		24, range 12, townships 29, ranges 15 and 16, township 30, range 17, township 23, range 18, township 48, range 19, township 11, range 22, township 46, range 23, township 7, range 24, and townships 31, ranges 28 and 29, all west of the second meridian. Miscellaneous surveys in townships 6 and 11, range 1, township 6, range 2, township 34, range 3, townships 33 and 34, range 6, township 32, range 7, townships 16 and 17, ranges 8 and 9, township 13, range 12, and township 41, range 18, all west of the third meridian. Traverse in township 16, range 18, township 18, range 21, and township 20, range 25, all west of the principal meridian. Traverse in township 27, range 14, townships 30 and 31, range 16, townships 31 and 40, range 17, township 39, range 24, townships 39 and 40, ranges 25 and 26, and township 38, range 28, all west of the second meridian. Traverse in township 34, range 6, west of the third meridian.
Fontaine, L. E..	Lévis, Que..	Inspection of contracts Nos. 12, 22, 25 and 28 of 1908; partial inspection of contract No. 22 of 1909; re-inspection of contracts Nos. 24, 31 and part of 2 of 1907; completion of inspection of contracts Nos. 7 and 27 and inspection of addition to contract No. 18 of 1908.
Francis, Jno..	Portage la Prairie, Man..	Restoration and retracement survey of townships 18 and 19, range 15, and townships 25 and 29, range 32; retracement in township 25, range 30 and townships 31 and 32, range 32, all west of the principal meridian. Retracement of township 24, range 4, and township 23, range 12; correction survey in townships 27, ranges 4 and 5, and retracement in township 25, range 4, township 26, range 6, and township 29, range 17, all west of the second meridian.
Garner, A. C..	South Qu'Appelle, Sask.	Correction survey in township 19, range 14, west of the second meridian.
Green, T. D...	Ottawa, Ont...	Contract No. 17 of 1909. Subdivision of township 44, ranges 2, 3 and 4, and townships 43 and 44, range 5, all west of the second meridian.
Hawkins, A. H...	Listowel, Ont...	Survey of the fifteenth base line from the east side of range 25 west of the fifth meridian to the west side of range 8 west of the sixth meridian, and the sixteenth base across ranges 1 to 4 inclusive west of the sixth meridian.
Heathcott, R. V..	Edmonton, Alta...	Contract No. 9 of 1909. Subdivision of townships 59 and 60, ranges 7, 8 and 9, west of the fifth meridian.



APPENDIX No. 1--*Continued.*

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—*Continued.*

Surveyor.	Address.	Description of Work.
Holcroft, H. S...	Toronto, Ont..	Subdivision in township 57, range 12; correction survey in township 47, range 14; resurvey in townships 57 and 58, ranges 9 and 10; retracement in township 41, range 11, townships 43, ranges 16 and 17, township 45, range 18, townships 43 and 44, range 20; traverse of Battle river in townships 41, 42 and 43, range 17, townships 43 and 44, range 18, and township 44, range 19; traverse of lake in township 38, range 16, and in townships 43 and 44, range 19; all west of the fourth meridian.
Hopkins, M. W...	Edmonton, Alta..	Contract No. 26 of 1909. Subdivision of townships 63 and 64, ranges 3, 4, 5, 6, 7, 8, 9 and 10, all west of the fourth meridian.
Hubbell, E. W...	Ottawa, Ont...	Resurvey of townships 21, 22, 23 and 24, range 11, and township 23, range 12, west of the third meridian. Inspection of contracts Nos. 4 and 26 of 1908, and contracts Nos. 4 and 18 of 1909.
Johnson, A. W...	Kamloops, B.C...	Subdivision in townships 6 and 7, range 26, townships 2 and 3, range 28, townships 2, 3 and 7, range 29, and township 3, range 30, all west of the sixth meridian; in townships 3 and 4, range 4, and township 3, range 5, west of the seventh meridian; and in township 38 west of the coast meridian. Resurvey in townships 6 and 7, range 26, township 3, range 28, townships 2, 3 and 7, range 29, west of the sixth meridian, in township 24, east of the coast meridian; in township 38 and in the fractional township west of township 39, west of the coast meridian; traverse in townships 6 and 7, range 26, townships 3 and 7, range 29, township 3, range 30, west of the sixth meridian, in township 24, east of the coast meridian, and in township 38, west of the coast meridian, and in the fractional township west of township 39, west of the coast meridian.
Kimpe, M...	Edmonton, Alta...	Contract No. 8 of 1909. Subdivision of townships 1, 2, 3 and 4, range 28, townships 1, ranges 29 and 30, west of the third meridian, townships 3, ranges 2, 3 and 4, townships 1, 2 and 3, range 5, townships 3, 4, 5 and 6, range 6, townships 6 and 7, range 7, townships 6, 7 and 8, ranges 8 and 9, west of the fourth meridian.
Knight, R. H...	Edmonton, Alta...	Contract No. 21 of 1909. Subdivision of townships 54, 55 and 56, ranges 25 and 26, and townships 55 and 56, range 27, west of the third meridian.
Laurie, R. C...	Battleford, Sask...	Resurvey in township 47, range 23, west of the third meridian. Contract No. 20 of 1909. Subdivision of township 54, range 23, and townships 54, 55 and 56, range 24, west of the third meridian.



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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—*Continued.*

Surveyor.	Address.	Description of Work.
Lonergan, G. J.. . . .	Buckingham, Que... .	Resurvey in townships 53 and 54, ranges 25 and 26 and in township 53, range 27, west of the fourth meridian; traverse in townships 53 and 54, range 27, west of the third meridian; retracement of St. Albert settlement. Inspection of contracts Nos. 19 of 1908; 2, 20, 21, 22 and 24 of 1909; completion of inspection of contract No. 23 of 1908.
Miles, C. F... . . . .	Toronto, Ont.. . . . .	Resurvey of township 23, range 5, townships 21 and 22, range 10, townships 25 and 26, ranges 17 and 18, west of the third meridian; correction survey in township 11, range 25, west of the second meridian; resurvey in townships 12 and 15, range 20, west of the second meridian; retracement in township 25, range 28 and townships 19 and 21, range 29, west of the second meridian and in township 15, range 24, and township 18, range 14, west of the third meridian; subdivision and traverse in township 5, range 8, west of the fourth meridian. Survey of timber berth No. 1596 in township 17, range 12, east of the principal meridian. Inspection of contracts Nos. 3, 5, 7, 8, 11, 14 and 15 of 1909; completion of inspection of contract No. 8 of 1908.
Molloy, John.. . . .	Winnipeg, Man.. . . .	Contract No. 19 of 1909. Subdivision of townships 11, ranges 13 and 14, townships 1, 2, 3, 4, 5, 6, 7 and 8, range 16, townships 1, 2, 3, 4, 6, 9, 10 and part of 5, range 17, and townships 2, 3 and 4, range 18, all east of the principal meridian.
Montgomery, R. H.. . .	Prince Albert, Sask....	Contract No. 18 of 1909. Subdivision of townships 44, 46, 47, 48, 49 and north third of 45, range 12, and township 42, range 13, all west of the second meridian.
Morrier, J. E.. . . .	Ottawa, Ont... . . . .	Contract No. 4 of 1909. Subdivision of townships 37 and 38, ranges 7 and 8; survey of the east outlines of townships 39 and 40, range 8, townships 38 and 39, range 9, and the north outline of township 38, range 9; traverse in township 37, range 9, all west of the second meridian.
McDiarmid, S. S... . .	Vancouver, B.C... . .	Subdivision and resurvey in township 4, range 3, west of the seventh meridian, and in townships 15 and 18, east of the coast meridian; traverse in township 4, range 2, and townships 3 and 4, range 3, west of the seventh meridian, and in townships 15 and 18, east of the coast meridian.
McFarlane, J. B... . .	Toronto, Ont.. . . . .	Subdivision in townships 51, ranges 24 and 25, townships 50 and 51, range 26, townships 49 and 50, range 27, township 48, range 28, west of the fifth meridian, and in townships 45, 46 and 47, range 1, and townships 45, ranges 2, 3 and 4, west of the sixth meridian.



1 GEORGE V., A. 1911

APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—*Continued.*

Surveyor.	Address.	Description of Work.
McFarlane, W. G...	Toronto, Ont..	Contract No. 1 of 1909. Subdivision of townships 72 and 73, range 3, township 72, range 4, townships 72 and 73, range 5, township 73, range 6, townships 72 and 73, ranges 7, 8 and 9, townships 71, 72 and 73, range 10, townships, 71, 72, 73 and 74, range 11, the north two-thirds of townships 71, ranges 3, 4, 5, 7, 8 and 9, the south two-thirds of township 74, ranges 4 and 5, the north third of townships 70, ranges 10 and 11, the south third of townships 74, ranges 3, 6, 7, 8, 9 and 10, the west third of township 71, range 6, and the east half of township 72, range 6; survey of the east outlines of townships 69 and 70, range 10, and townships 69, 70, 75 and 76, ranges 11 and 12, all west of the sixth meridian.
McFee, A...	Red Deer, Alta..	Subdivision in township 40, range 18, and townships 41 and 42, range 19; survey of north outline of township 39, range 17, and part east outline of township 40, range 17, and township 39, range 18, all west of the fifth meridian.
McGrandle, H...	Wetaskiwin, Alta...	Contract No. 10 of 1909. Subdivision of townships 52, ranges 10, 11 and 12, west of the fifth meridian.
McMillan, Geo...	Ottawa, Ont...	Survey of the seventeenth base line from the east boundary of range 27, west of the fifth meridian to the middle of range 9, west of the sixth meridian; and of the eighteenth base line from the east boundary of range 9 to the west boundary of range 14 west of the sixth meridian. Inspection of contract No. 1 of 1909.
McNaughton, A. L...	Cornwall, Ont...	Retracement of township 47, range 3; resurvey of townships 44 and 46, range 3, townships 46 and 47, range 4, and the east outline of township 48, range 3; traverse in township 46, range 3 and townships 46 and 47 range 4, west of the third meridian.
Ord, L. R...	Hamilton, Ont...	Stadia traverse of part of lac LaRonge.
Plunkett, T. H...	Toronto, Ont...	Subdivision in townships 24 and 25, ranges 19 and 20, townships 28, ranges 22 and 23, township 29, range 25, townships 20 and 21, range 29, west of the fifth meridian, and in townships 21 and 22, range 1, townships 22 and 23, range 2, township 20, range 9, townships 18, 19 and 20, range 10, townships 18 and 19, range 11, township 14, range 23, township 16, range 26 and townships 17, ranges 27 and 28, west of the sixth meridian; traverse in townships 28, ranges 22 and 23, west of the fifth meridian, and also in townships 13 and 14, range 23, township 16, range 26, township 17, range 27, and townships 17 and 18, range 28, west of the sixth meridian; resurvey in township 24, range 19, townships 25, ranges 20 and 21, township 28, range 22, townships 20 and 21,



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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—*Continued.*

Surveyor.	Address.	Description of Work.
		range 29, west of the fifth meridian, also in townships 21 and 22, range 1, township 23, range 2, township 20, range 9, and townships 18, 19 and 20, range 10, west of the sixth meridian.
Ponton, A. W...	Edmonton, Alta...	Survey of the fifth meridian north from township 107; no returns yet received.
Reilly, W. R...	Regina, Sask...	Retracement in townships 36 and 41, range 1, west of the third meridian; resurvey in township 49, range 21, townships 45, ranges 27 and 28, west of the second meridian, and in township 42A, range 1, township 41, range 2, and township 48, range 3, west of the third meridian; correction survey in township 31, range 9, and township 49, range 12, west of the third meridian.
Robinson, E. W...	Ottawa, Ont...	Subdivision in townships 23 and 24, range 1, townships 23, 24, 26 and 27, range 2, township 19, range 6, townships 18 and 19, range 7, townships 17, ranges 8 and 9, townships 25, ranges 10, 11 and 12, west of the sixth meridian; traverse in townships 23 and 24, range 1, townships 19, ranges 5, 6 and 7, township 17, range 9, and township 25, range 12, west of the sixth meridian; resurvey in township 24, range 1, and townships 23, 24 and 27, range 2, west of the sixth meridian.
Rolfson, O...	Walkerville, Ont...	Retracement of township 13, range 26, west of the principal meridian, and of township 12, range 5 and township 14, range 7, west of the second meridian; correction survey of township 13, range 7, township 7, range 8, township 2, range 11, townships 1 and 2, range 12, and part of townships 14 and 15, range 9, west of the second meridian.
Ross, J. E...	Kamloops, B.C...	Subdivision in township 21, range 7, townships 19 and 21, range 8, township 21, range 9, townships 21 and 22, range 10, townships 17, 22 and 23, range 11, townships 17, 21, 22 and 23, range 12, townships 16, 17, 18, 20, 21, 22 and 23, range 13, townships 16, 17, 18, 20 and 21, range 14, townships 18, 20 and 23, range 15, and township 18, range 16, west of the sixth meridian. Resurvey in township 19, range 8, townships 22 and 23, range 12, townships 17, range 13, township 23, range 15, township 19, range 17, and townships 18 and 19, range 18, west of the sixth meridian; traverse in townships 19 and 22, range 8, townships 21, ranges 9 and 10, townships 21, 22 and 23, range 12, townships 16, 20, 21 and 23, range 13, township 16, range 14 and townships 16, 18 and 23, range 15, west of the sixth meridian.
Roy, G. P...	Quebec, Que...	Contract No. 22 of 1909. Subdivision of townships 57 and 58, range 12, and townships 57, 58 and 59, range 13; survey of the east outline of township 60, range 14, west of the fifth meridian.



APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—*Continued.*

Surveyor.	Address.	Description of Work.
Saint Cyr, A... ..	Ottawa, Ont.. ..	Survey of the third meridian from the fourteenth to the sixteenth base line, and the sixteenth base line from the third to the fourth meridian.
Saint Cyr, J. B... ..	Montreal, Que.. ..	Subdivision of townships 77, 78 and 79, range 5; part subdivision of townships 77 and 78, range 6; survey of the east outline of township 80, range 6; traverse in township 77, range 4, west of the sixth meridian. Miscellaneous surveys in Dunvegan, Peace River Crossing, and Shaftsbury settlements.
Saunders, B. J... ..	Edmonton, Alta.. ..	Survey of the ninth and tenth base lines across ranges 8, 9 and 10 and the tenth base line across range 11, west of the fifth meridian.
Scott, W. A... ..	Galt, Ont.. ..	Subdivision in townships 13, ranges 1 and 2, townships 9, 10 and 13, range 3, and townships 8, 9 and 10, range 4, west of the fifth meridian.
Selby, H. W... ..	Toronto, Ont.. ..	Subdivision of township 77, range 20, townships 77 and 78, range 21; part subdivision of townships 71 and 72, range 1, townships 72, ranges 2 and 3, and townships 77 and 78, range 22; survey of the east outlines of townships 79 and 80, ranges 21 and 22, west of the fifth meridian.
Seymour, H. L... ..	Edmonton, Alta.. ..	Contract No. 5 of 1909. Subdivision of townships, 1, 2, 3 and 4, ranges 21, 22 and 23, townships 1, 2, 3, 4 and 5, ranges 24 and 25, and township 5, range 26, west of the third meridian.
Steele, I. J... ..	Ottawa, Ont.. ..	Contract No. 3 of 1909. Subdivision of townships 1, ranges 23, 24, 25, 26 and 27, townships 1 and 2, range 28, townships 1, 2, and 3, ranges 29 and 30, west of the second meridian, also townships 1, 2 and 3, ranges 1, 2 and 3, and townships 1, 2, 3 and 4, range 4, west of the third meridian.
Teasdale, C. M... ..	Concord, Ont.. ..	Contract No. 6 of 1909. Subdivision of townships 26 and 27, range 6, townships 27, ranges 7 and 8, and townships 27 and 28, range 9; survey of the east outline of townships 28, ranges 6, 7 and 8, west of the principal meridian.
Thibaudeau, W... ..	Montreal, Que.. ..	Reconnaissance survey of the headwaters of Bow river, of Waterton river in the vicinity of Waterton lakes and of Cypress lakes and the southern slope of the Cypress hills with a view to locating suitable sites for the construction of storage reservoirs for irrigation and other purposes.
Tyrrell, J. W... ..	Hamilton, Ont.. ..	Contract No. 12 of 1909. Subdivision of townships 26 and 27, ranges 3, 4 and 5; survey of the east outlines of townships 28 ranges 4 and 5, west of the principal meridian.



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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed, and work executed by them, from April 1, 1909, to March 31, 1910—*Continued.*

Surveyor.	Address.	Description of Work.
Waddell, W. H.. ..	Edmonton, Alta.. ....	Contract No. 24 of 1909. Subdivision of townships 62 and 63, ranges 25 and 26, and township 62, range 27; survey of the east outlines of townships 64, ranges 26 and 27, west of the fourth meridian.
Waldron, J.. ..	Moosejaw, Sask.. ..	Contract No. 14 of 1909. Subdivision of townships 5 and 6, ranges 9 and 10, townships 1, 2, 3, 4, 5 and 6, ranges 11 and 12, townships 4, 5 and 6, range 13, townships 5 and 6, ranges 14 and 15, townships 6, ranges 16 and 17, and the south third of townships 7, ranges 13, 14 and 15, west of the third meridian.
Walker, E. W.. ..	Disley, Sask.. ..	Partial resurvey of township 11, range 22, west of the second meridian.
Wallace, J. N.. ..	Calgary, Alta.. ..	Survey of the fourth meridian from the north boundary of section 12, township 63 to the north boundary of township 80.
Warren, Jas.. ..	Walkerton, Ont.. ....	Part subdivision of township 14, range 2, township 20, range 4, and township 23, range 9; survey of the sixth base line across ranges 5, 6 and part of 7, and part of the east outline of township 15, range 3; survey of villa lots in township 24, range 1, west of the fifth meridian.
Wheeler, A. O... ..	Calgary, Alta.. ..	Examination of land below Golden, between Revelstoke and Shuswap lake, and in Shuswap district for purposes of classification into fruit land, farming land, grazing land, timber land and worthless land.
Young, W. H.. ..	Lethbridge, Alta.. ...	Retracement in townships 6 and 7, range 17 west of the fourth meridian; retracement and restoration of township 7, range 1; subdivision in townships 6 and 7, range 4, west of the fifth meridian.



APPENDIX No. 2.

SCHEDULE showing for each surveyor employed from April 1, 1909, to March 31, 1910, the number of miles surveyed, of township section lines, township outlines, traverses of lakes and rivers and resurvey, also the cost of the same.

Surveyor.	Miles of section line.	Miles of outline.	Miles of traverse.	Miles of resurvey.	Total mileage.	Total cost.	Cost per mile.	By day work or by contract.
						\$	\$ cts.	
Aylsworth, C. F.			66	239	305	10,729	35 26	Day.
Baker, J. C.	129	16	4		149	4,550	30 55	Contract.
*Belanger, P. R. A.	1		13	31	45	3,934	87 42	Day.
Bolton, Lewis.	218		6		224	6,752	30 14	Contract.
Brownlee, J. H.	6			5	11	1,175	106 81	Day.
Cautley, R. H.	1,159	133	18	2	1,312	10,086	7 70	Contract.
Chilver, C. A.	1,197	139	4		1,340	11,476	8 56	"
Christie, Wm.		162			162	14,300	88 27	Day.
Coté, J. L.	1,086	18	8		1,106	8,585	7 76	Contract.
Davies, T. A.	336	3	179	12	590	14,318	24 27	"
Deans, W. J.			11	307	318	7,611	23 93	Day.
Doupe, Jos.		6		41	47	638	13 58	"
Ducker, W. A.		34			34	6,000	176 47	"
Edwards, Geo.	193	6	20		219	6,343	29 95	Contract.
Fairchild, C. C.			98	27	125	5,868	46 94	Day.
Farncomb, A. E.	248	48	25		321	9,500	29 60	Contract.
Fawcett, Thos.			34	212	246	5,346	21 73	Day.
Francis, John.			38	460	498	9,500	19 08	"
Green, T. D.	221	6	89		316	8,015	25 37	Contract.
Hawkins, A. H.		89			89	19,940	224 00	Day.
Heathcott, R. V.	266		70		336	9,293	27 66	Contract.
Holcroft, H. S.	5		108	161	274	7,540	27 52	Day.
Hopkins, M. W.	764		109		873	26,091	29 88	Contract.
*Hubbell, E. W.			22	294	316	4,343	13 74	Day.
Johnson, A. W.	10		45	11	66	15,500	234 85	"
Kimpe, M.	1,179				1,179	8,912	7 56	Contract.
Knight, R. H.	364	21	127		512	12,526	24 46	"
Laurie, R. C.	234	37	47		318	7,386	23 23	"
*Lonergan, G. J.			186	102	288	7,319	25 41	Day.
*Miles, C. F.	34		29	520	583	5,960	10 22	"
Molloy, John.	1,156	114	147	18	1,435	40,049	27 90	Contract.
Morrier, J. E.	200	36	44		280	7,791	27 33	"
Montgomery, R. H.	299	20	26		345	10,118	29 33	"
McFarlane, J. B.	149	7	4	1	161	15,686	97 43	Day.
McFarlane, W. G.	1,090	245			1,335	38,886	29 13	Contract.
McFee, A.				61	61	7,996	131 08	Day.
McGrandle, H.	145	18			163	4,700	28 84	Contract.
McMillan, Geo.		85			85	22,385	263 35	Day.
McNaughton, A. L.			127	298	425	11,500	27 06	"
Ord, L. R.			235		235	3,551	15 11	"
Plunkett, T. H.	99		27	10	136	10,700	78 68	"
Reilly, W. R.			85	345	430	9,500	22 10	"
Robinson, E. W.	58		13	4	75	12,223	162 98	"
Rolfson, O.			57	508	565	10,216	18 08	"
Ross, J. E.	112		40	13	165	9,203	55 77	"
Roy, G. P.	236	24	61		321	9,466	29 48	Contract.
Saint Cyr, A.		208			208	28,300	136 06	Day.
Saint Cyr, J. B.	214	36	41		291	12,557	43 15	"
Saunders, B. J.		42			42	13,000	309 52	"
Scott, W. A.	80	12		4	96	9,504	99 00	"
Selby, H. W.	218	60	42		320	12,434	38 86	"
Seymour, H. L.	1,124	97	2	6	1,229	9,278	7 55	Contract.
Steele, I. J.	1,236	90	36	18	1,380	11,832	8 57	"
Teasdale, C. M.	310	30	12	12	364	10,963	30 12	"
Tyrrell, J. W.	334	31	12		377	11,008	29 19	"
Waddell, W. H.	217	32	38		287	8,141	28 71	"
Waldron, Jno.	1,265	64	5		1,334	11,018	8 26	"
Wallace, J. N.		106			106	17,600	166 64	Day.
Warren, Jas.	46	12	3	6	67	7,750	115 67	"
Young, W. H.	34	2		148	184	8,400	45 65	"
	16,326	2,089	2,413	3,876	24,704	665,291		

\* Inspector of contract surveys; the total cost includes only the proportional part of the whole cost of the party for the season, determined from the time occupied on miscellaneous surveys.



SESSIONAL PAPER No. 25b

APPENDIX No. 3.

LIST of lots in the Yukon Territory, survey returns of which have been received from April 1, 1909, to March 31, 1910.

GROUP No. 1.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
41	40.61	C. S. W. Barwell	1908	July 27, 1909..	A. P. Schultze.....	Surface.

GROUP No. 2.

365	51.65	T. D. Green .....	1909	*	Mrs. L. D. Schmidt.....	Aulas, M. C.
388	0.79	C. W. MacPherson.	1909	*	The White Channel Gold Hill Hydraulic Co.	Right of way for flume.
K24	1.82	" "	1909	*	" " " "	" "
404	50.5	C. S. W. Barwell	1908	*	Mrs. L. Schmidt.....	An Curd, M. C.
408	43.2	" "	1909	April 4, 1909..	Wm. Catto, F. A. Chute and the Stewart estate.	New Bonanza, M. C.
409	5.5	" "	1909	*	" " " "	Niobe, M. C.
410	41.2	" "	1909	*	" " " "	Lone Star, M. C.
411	33.4	" "	1909	*	" " " "	Zulu Chief, M. C.
412	10.9	" "	1909	April 19, 1909..	William Austell.....	Surface rights.
413	34.6	" "	1909	*	Margaret J. Mitchell....	Little Minnie, M. C.
414	44.7	" "	1909	*	" " " "	Mastodon, M. C.
417	347.17	" "	1909	*	Northern Light, Power and Coal Co.	Right of way for power transmission line.
420	35.23	Jas. Gibbon .....	1909	*	Frank J. McDougal <i>et al.</i> .	Ottawa, M. C.
421	11.27	" .....	1909	Aug. 10, 1909..	William Williams.....	Lillias, M. C.
422	51.65	" .....	1909	Feb. 15, 1910..	Frank J. McDougal <i>et al.</i> .	Regina, M. C.
423	34.6	" .....	1909	*	Mrs. Jennie Balton.....	Francette, M. C.
424	51.5	" .....	1909	Aug. 10, 1909..	Jas. Cameron and Jas. Lester	New Bonanza, M. C.
431	48.63	" .....	1909	*	Robert A. Lawther.....	Iron King, M. C.
432	44.61	" .....	1909	*	" " " "	Silver King, M. C.
433	51.65	" .....	1909	*	Lizzie Olivia Craig, Geo. A. Hunter and W. J. Elliott.	American, M. C.
434	46.8	" .....	1909	*	" " " "	Canadian, M. C.
435	51.65	" .....	1909	*	Geo. A. Hunter, J. H. Thorne, R. H. S. Creswell, J. Pickering and W. J. Elliott.	White Rose, M. C.
436	51.65	" .....	1909	*	" " " "	Yukon Star, M. C.
437	51.65	" .....	1909	*	" " " "	Nero, M. C.
438	49.10	" .....	1909	*	Mary Rebecca Knorr, per J. J. Hartman.	Stratton, M. C.
443	36.34	" .....	1909	*	Dome Lode Development Co.	Colorado, M. C.
446	41.8	" .....	1909	*	Lillie E. Sturtevant.....	Lone Star, M. C.
451	44.26	" .....	1909	*	Jno. F. Patterson and Lizzie O. Craig.	Georgie, M. C.
452	51.65	" .....	1909	*	" " " "	Cissie, M. C.
456	48.24	Jas. Gibbon .....	1909	*	Malvine Brosseau & Joseph Fournier.	Alexander, M.C.
457	38.66	" .....	1909	*	Joseph Fournier .....	Clara, M.C.
458	40.13	" .....	1909	*	Malvine Brosseau & Joseph Fournier.	Cestrian, M.C.
464	14.72	" .....	1909	*	Malcom Nicholson & A. W. Complin.	Helena, M.C.
468	25.54	" .....	1909	*	Joseph Fournier.. .....	Congdon, M.C.
469	10.00	" .....	1909	*	" " " "	Surface rights.
470	10.00	" .....	1909	*	" " " "	" "
472	640.00	C. S. W. Barwell	1909	*	F. W. Morrison.....	Coa <sup>l</sup> claim.
473	640.00	" .....	1909	*	" " " "	" "
474	640.00	" .....	1909	*	" " " "	" "
475	640.00	" .....	1909	*	" " " "	" "
501	45.42	N. A. Burwash..	1909	*	James Lloyd & R. B. Segbers	Cousin Jack, M.C.
502	51.09	" .....	1909	*	M. R. Knorr, J. L. Lloyd & R. B. Segbers.	Blueberry, M.C.

\* Not yet approved.



APPENDIX No. 3—Continued.

List of lots in the Yukon Territory, survey returns of which have been received from April 1, 1909 to March 31 1910—Continued.

GROUP No. 2—Continued.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
520	25.03	N. A. Burwash..	1909	*	Joseph Fournier .....	Belle Chasse, M.C.
570	5.73	C. W. MacPherson.	1909	*	Yukon Gold Co.....	Surface, intake and flume.
571	4.51	"	1909	*	"	Surface power house, &c.

GROUP No. 5.

114	17.60	H. G. Dickson.	1907	June 9, 1909..	Miss Maggie LaRose.....	Little Chief No. 2, M.C.
116	39.06	"	1907	Feb. 15, 1910..	A. B. Palmer.....	Palmer No. 2, M.C.
117	65.77	"	1907	" 15, 1910..	"	Dawson, M.C.
118	132.19	"	1907	" 15, 1910..	"	Bonanza, M.C.
119	152.45	"	1907	Mar. 7, 1910..	"	Eldorado, M.C.
120	152.45	"	1907	" 7, 1910..	"	Henderson, M.C.
151	105.80	"	1907	" 7, 1910	"	Arthur, M.C.
152	86.20	"	1907	" 7, 1910..	"	Russell, M.C.
153	111.16	"	1907	Feb. 15, 1910..	"	Claude, M.C.
158	48.89	"	1909	June 9, 1909..	Roland Ryder.....	Bingo, M.C.
159	51.51	"	1909	" 9, 1909..	"	Annie, M.C.
160	51.65	"	1909	" 16, 1909..	Père August Nelson.....	Portland, M.C.
161	27.17	"	1909	"	A. B. Palmer.....	Elmira, M.C.
182	39.97	N. A. Burwash..	1909	Dec. 16, 1909	E. Johnson .....	Surprise, M.C.
183	3.88	"	1909	Nov. 24, 1909..	"	Big Bear (Frac.), M.C.
185	41.99	"	1908	" 24, 1909..	K. Weik.....	Centre, M.C.
186	142.43	"	1909	*	J. L. Shroeder.....	Buccaneer No.1, M.C.
187	145.95	"	1909	"	"	" No.2, M.C.
188	9.63	"	1909	Feb. 15, 1910..	H. Chambers .....	Surface.
190	156.94	"	1909	Aug. 10, 1909..	The Public Administrator et al. ....	Bornite, M. C.
191	151.85	"	1909	" 10, 1909..	"	Boston, M.C.
192	80.00	"	1909	Dec. 22, 1909..	E. A. Pelletier..	Surface.
193	51.65	"	1909	"	A. Thompson.....	Golgonda, M.C.
194	51.45	"	1909	*	"	Florence M., M.C.
195	50.47	"	1909	*	P. Campbell.....	Concord.
196	51.60	"	1909	*	"	Mohawk, M.C.

GROUP No. 6.

20	50.44	H. G. Dickson..	1907	*	J. H. Conrad.....	Venus, M.C.
21	51.13	"	1907	*	"	Venus No. 2, M.C.
22	11.12	"	1907	*	"	Venus Fraction, M.C.
24	3.52	"	1907	*	"	Mars, M.C.
25	51.08	"	1907	*	"	M. & M., M.C.
26	21.48	"	1907	"	"	Vault, M.C.
76	34.69	"	1907	"	"	Annex, M.C.
79	5.00	"	1908	Feb 15, 1910..	A. B. Palmer.....	Surface.
80	35.80	"	1908	*	R. H. Chadwick.....	Ruby Silver Extension, M.C.
151	9.70	N. A. Burwash..	1908	*	A. B. Palmer .....	Allin, M.C.
152	38.10	"	1908	*	"	Celtic, M.C.
153	17.17	"	1908	*	"	Iron Mask, M.C.
154	44.82	"	1908	*	"	A. D., M.C.
155	12.86	"	1908	"	"	First Chance, M.C.
156	33.41	"	1908	"	"	Iron Cap, M.C.
157	38.37	"	1908	*	"	Douglas, M.C.
158	0.005	"	1908	"	"	Russell (Fraction), M.C.

\*Not yet approved.



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APPENDIX No. 3—*Continued.*

LIST of lots in the Yukon Territory, survey returns of which have been received from  
April 1, 1909, to March 31, 1910—*Continued.*

GROUP No. 15.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
1	100 00	H. G. Dickson..	1904	July 24, 1909..	Harry Chambers.....	Surface.
2	26 18	" ..	1904	" 24, 1909..	" ..	"



APPENDIX No. 4.

LIST of miscellaneous surveys in the Yukon Territory, returns of which have been received, from April 1, 1909, to March 31, 1910.

Year.	Surveyor.	Description of Survey.
1908	H. G. Dickson.....	Wheaton river reference traverse.
1908	Jas. Gibbon.....	Base lines and side lines on Black Hills creek.
1909	H. G. Dickson .....	Continuation of Wheaton river reference traverse.
1909	C. W. MacPherson.....	Base lines on Examiner, Dion and Falconer gulches.
1909	Jas. Gibbon.....	Base lines on Clear creek and Barney creek.
1909	Jas. Gibbon.....	Base lines on Clear creek and Eldorado creek.
1909	C. W. MacPherson.....	Base lines on Little Blanch creek and right and left forks.
1909	C. W. MacPherson.....	Base line on Miller creek.



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## APPENDIX No. 5.

STATEMENT of work executed in the office of the Chief Draughtsman:—

Letters of instructions to surveyors.. . . . .	279
Progress sketches received and filed.. . . . .	1,214
Declarations of settlers received and filed.. . . . .	383
Returns of separate blocks of timber berths received.. . . . .	128
Plans received from surveyors.. . . . .	568
Field books received from surveyors.. . . . .	679
Timber reports received.. . . . .	451
Observations for magnetic declination received.. . . . .	567
Preliminary township plans prepared.. . . . .	467
Sketches made.. . . . .	3,028
Maps and tracings made.. . . . .	256
Plans of Yukon lots received.. . . . .	91
Plans of miscellaneous Yukon surveys received.. . . . .	8
Yukon lots reduced to 40 chains to 1 inch and plotted on group plans.. . . . .	31
Returns of surveys examined—	
Township subdivision.. . . . .	475
Township outline.. . . . .	247
Road plans.. . . . .	265
Railway plans.. . . . .	34
Mineral claims.. . . . .	7
Timber berths.. . . . .	165
Correction and other miscellaneous surveys.. . . . .	148
Township plans compiled.. . . . .	779
Townsite, settlement and other plans compiled.. . . . .	15
Proofs of plans examined.. . . . .	96
Township plans printed.. . . . .	705
Townsite and settlement plans printed.. . . . .	5
Descriptions written.. . . . .	12
Pages of field notes copied.. . . . .	288
Applications for various information dealt with.. . . . .	2,374
Files received and returned.. . . . .	2,191
Letters and memoranda drafted.. . . . .	7,917
Books received from Record Office and used in connection with office work.. . . . .	5,093
Books returned to Record Office.. . . . .	5,301
Plans other than printed township plans received from Record Office and used in connection with office work.. . . . .	631
Plans returned to the Record Office.. . . . .	813
Volumes of plans received from Record Office and used in connection with office work.. . . . .	70
Volumes of plans returned to Record Office.. . . . .	88
Books sent to Record Office to be placed on record.. . . . .	725
Plans other than township plans sent to Record Office to be placed on record.. . . . .	430
Sectional maps (3 miles to 1 inch)—	
Revised.. . . . .	60
Reprinted.. . . . .	11
Sectional maps (6 miles to 1 inch)—	
Reprinted.. . . . .	39
Revised for Railway Lands Branch.. . . . .	68



APPENDIX No. 6.

LIST of new editions of sectional maps issued from April 1, 1909, to March 31, 1910.

(Scale 3 miles to one inch.)

No.	Name.	No.	Name.	No.	Name.	No.	Name.
14	Pincer Creek.....	68	Swift Current.....	165	Rosebud.....	266	Ribstone Creek.
22	Dufferin .....	74	Cross Lake.....	216	Sullivan L.....	316	Vermilion.
65	Macleod.....	120	Qu'Appelle.....	264	Brazeau. ....		

(Scale 6 miles to one inch.)

No.	Name.	No.	Name.	No.	Name.	No.	Name.
18	Wood Mountain....	71	Brandon.....	122	Manitoba House....	221	Swan River.
19	Willowbunch. . .	72	Portage la Prairie..	123	Ft. Alexander.....	268	Carlton.
20	Souris. ....	74	Cross Lake. ....	166	Sounding Cr.....	269	Prince Albert S.
21	Turtle Mountain....	114	Calgary .....	167	Bad Hills. ....	270	Pasquia.
23	Emerson.. ....	115	Blackfoot.....	169	Touchwood.....	271	Mossy Portage.
24	Lake of the Woods..	116	Rainy Hills.....	170	Yorkton. ....	317	Fort Pitt.
64	Porcupine .....	117	Red Deer Forks....	214	Rocky Mt. House...	318	Shell River.
65	Macleod.....	118	Rush Lake.....	218	Saskatoon .....	319	Prince Albert N.
69	Moosejaw .....	119	Regina.....	219	Humboldt.....	365	Victoria.
70	Moose Mountain.	121	Riding Mountain....	220	Nut Mountain.....		



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APPENDIX No. 7.

STATEMENT of work executed in the photographic office from April 1, 1909, to March 31, 1910.

	3½ x 3½	4 x 5	5 x 7	8 x 10	10 x 12	11 x 14	16 x 18	18 x 20	20 x 24	24 x 30	30 x 36	36 x 42	42 x 48	Total.
Dry plate negatives.....		510	744											1,254
Bromide prints.....		314	36			46	277	96						999
Silver prints.....		2,320	4,412		1	6						44	6	6,774
Vandyke prints.....			14		2	205	497	312					28	1,489
Blue prints.....					15	5	20	7						177
Lantern transparencies.....	620													620
Photographs mounted.....			296				166							462
Wet plate negatives.....			57			136	1,003	138	22					1,457
Photo-litho plates.....								990						990
	620	3,144	5,559	264	18	398	1,963	1,543	22	403	97	157	34	14,222



1 GEORGE V., A. 1911

## APPENDIX No. 8.

STATEMENT of work executed in the lithographic office from April 1, 1909, to March 31, 1910.

Month.	MAPS.		TOWNSHIPS.		FORMS, &c.	
	No.	Copies.	No.	Copies.	No.	Copies.
1909.						
April.....	2	19,400	76	15,200	16	10,500
May.....	6	30,600	83	16,600	3	1,150
June.....	1	500	91	18,200	6	7,580
July.....	5	5,600	12	2,400	1	225
August.....			76	15,200	2	1,150
September.....	45	18,850	71	14,200	3	15,500
October.....	1	200			3	1,100
November.....	2	19,100			8	7,945
December.....	2	575	129	25,800	4	2,400
1910.						
January.....			51	10,200	5	2,500
February.....	2	1,475	63	12,600	6	3,175
March.....	10	14,350	57	11,400	11	7,383
Total.....	76	110,650	709	141,800	68	60,608

	No.	Copies.	Impressions.	Cost.
				\$ cts.
Maps.....	76	110,650	275,200	3,065 50
Townships.....	709	141,800	150,600	5,266 20
Forms, &c.....	68	60,608	73,033	1,003 66
Grand total...	853	313,058	498,833	9,335 36



APPENDIX No. 9.

List of employees of the Topographical Surveys Branch at Ottawa, giving the name, classification, duties of office and salary of each. (Metcalf street, corner of Slater.)

Name.	CLASSIFICATION.		Duties of Office.	Salary.
	Division	Sub-division.		
				\$ cts.
Deville, E., D.T.S., LL.D .. .. .	1	A	Surveyor General.....	3,450 00
	CORRESPONDENCE			
Brady, M.....	1	B	Secretary .....	2,200 00
Cullen, M. J.....	3	A	Stenographer .....	1,200 00
Moran, J. F.....	3	B	Typewriter and clerk.....	800 00
Williams, E. R.....	3	B	Correspondence clerk.....	800 00
Lynch, F.....	3	B	Typewriter.....	800 00
Addison, W. G.....	3	B	Typewriter.....	700 00
Paquette, A.....	3	B	Clerk .....	800 00
Pegg, A .....			Messenger.....	800 00
	ACCOUNTS.			
Hunter, R. H .....	2	A	Accountant... ..	2,000 00
Wilkinson, Percy.....	3	A	Asst. accountant.....	1,000 00

Chief Draughtsman's Office—General direction and supervision of the technical work.

Symes, P. B .....	1	B	Chief draughtsman.....	2,250 00
Shanks, T., B.A.Sc., D.I.S .....	1	B	Asst. chief draughtsman..	2,350 00







SESSIONAL PAPER No. 25b

Chief Draughtsman's Office, Third Section—(Imperial Building, Queen street). Copying plans for reproduction.

Name.	CLASSIFICATION.		Duties of Office.	Salary.
	Division	Sub-division.		
				\$ cts.
Engler, Carl, B.A., D.L.S. ....	2	A	Chief of division.....	1,950 00
May, J. E. ....	2	A	Asst. chief of division...	1,800 00
O'Connell, J. R. ....	2	B	Draughtsman.....	1,600 00
Moule, W. J. ....	2	B	" .....	1,550 00
Helmer, J. D. ....	2	B	Clerk.....	1,000 00
Dawson, R. J. ....	2	B	" .....	1,000 00
Archambault, E. ....	2	B	" .....	1,000 00
Watters, James. ....	3	A	Printer.....	1,200 00
Tremblay, A. ....	3	B	Clerk.....	800 00
Brown, A. ....	3	B	" .....	800 00
Ebbs, E. J. ....	3	B	" .....	700 00
Bradley, J. D. ....	3	B	" .....	500 00
Marchand, C. E. ....	3	B	Engrosser.....	500 00

Chief Draughtsman's Office, Fourth Section—(Metcalf street, corner of Slater).  
British Columbia surveys.

Rowan-Legg, E. L. ....	2	A	Chief of division.....	1,950 00
Gillmore, E. T. B., Grad. R.M.C. ....	2	A	Asst. chief of division...	1,900 00
Lawe, H., D.L.S. ....	2	A	" .....	1,800 00
MacIlquham, W. L., B.Sc. ....	2	A	" .....	1,800 00
Morley, R. W. ....	2	A	" .....	1,800 00
Weld, W. E. ....	2	A	" .....	1,800 00
Wilson, E. E. D. ....	2	B	Draughtsman.....	1,600 00
Osmond, H. ....	2	B	" .....	1,200 00
Harris, K. D. ....	2	B	" .....	1,200 00

Chief Draughtsman's Office, Fifth Section—(Imperial Building, Queen street).  
Mapping.

Smith, J. ....	1	B	Chief of division.....	2,350 00
Begin, P. A. ....	2	A	Asst. chief of division...	1,850 00
Genest, P. F. X. ....	2	A	" .....	1,800 00
Flindt, A. H. ....	2	A	" .....	1,600 00
Blanchet, A. E. ....	2	B	Draughtsman.....	1,600 00
Davies, T. E. S. ....	2	B	" .....	1,500 00
Perrin, V. ....	2	B	" .....	1,500 00
Davy, E. ....	2	B	" .....	1,300 00
Villeneuve, E. ....	2	B	" .....	1,000 00
Bergin, W. ....	2	B	" .....	1,000 00
Vacant.....	2	B	.....	1,000 00



Chief Draughtsman's Office, Sixth Section—(Imperial Building, Queen street.)  
Scientific and topographical work.

Name.	CLASSIFICATION.		Duties of Office.	Salaries.
	Division	Sub-division		
				\$ cts.
Dodge, G. B., D.L.S.....	1	B	Chief of division .....	2,350 00
Blanchard, J. F.....	2	B	Draughtsman.....	1,000 00
Chartrand, D. E., B.Sc.....	2	B	" .....	1,000 00
Coté, J. A., Grad. R.M.C.....	2	B	" .....	1,000 00
Cousineau, A.....	2	B	" .....	1,000 00
Dozois, L. O. R., Grad. R.M.C.....	2	B	" .....	1,000 00
Hoar, C. M., B.Sc.....	2	B	" .....	1,000 00
Fredette, J. F.....	3	B	Clerk.....	500 00
Vacant.....	3	B	" .....	500 00
" .....	3	B	" .....	500 00
" .....	3	B	" .....	500 00
" .....	3	B	" .....	500 00
" .....	3	B	" .....	500 00

Geographic Board (Woods Building, Slater street).

Whitcher, A. H., F.R.G.S., D.L.S.....	2	A	Secretary .....	2,100 00
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Photographic Office (Metcalfé street, corner Slater street).

Carruthers, H. K.....	2	A	Process photographer .....	1,800 00
Woodruff, John.....	2	A	Chief " .....	1,800 00
Whitcomb, H. E.....	3	A	Photographer.....	1,200 00
Morgan, W. E.....	3	A	" .....	1,100 00
Kilmartin. A.....	3	B	Asst. photographer.....	800 00
Devlin, A.....	3	B	" .....	800 00
Quimet, E. G.....	3	B	" .....	800 00

Lithographic Office (unclassified) (Metcalfé street, corner Slater street).

Name.	Occupation.	Salaries.
Moody, A.....	Foreman .....	\$25 00 per week.
Burnett, E.....	Lithographer.....	25 00 "
Thicke, C. R.....	" .....	22 00 "
Deslauriers, J. H.....	Transferrer .....	20 00 "
Bergin, J.....	Printer.....	20 00 "
Thicke, H. S .....	" .....	18 00 "
Boyle, S. ....	Stone polisher.....	14 00 "
Gagnon, J .....	Press feeder.....	11 00 "
Kane, P. ....	" .....	7 00 "
Easton, H. M .....	Printer.....	17 50 "



SESSIONAL PAPER No. 25b

## APPENDIX No. 10.

List of Dominion Land Surveyors who have been supplied with Standard Measures.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Austin, George Frederick.....	Not known.....		April 14, '72	
Aylen, John.....	North Bay, Ont.....		May 29, '85	
Aylsworth, Charles Fraser.....	Madoc, Ont.....	April 21, '62	" 13, '86	O. L. S.
Baker, James Clarence.....	Vermilion, Alta.....	May 12, '78	" 18, '06	
Baker, Mason Hermon.....	St. Thomas, Ont.....	July 9, '84	Aug. 6, '08	"
Barwell, Chas. Sedley Wm.....	Dawson, Y. T.....		April 21, '94	
Bayne, George A.....	Winnipeg, Man.....	Oct. 25, '50	" 14, '72	M. L. S.
Beatty, David.....	Parry Sound, Ont.....	Dec. 22, '42	" 14, '72	O. L. S.
Beatty, Walter.....	Delta, Ont.....		" 14, '72	"
Begg, William Arthur.....	Hamilton, Ont.....	July 15, '82	June 8, '09	
Belanger, Phidime Roch Arthur	Ottawa, Ont.....	Mar. 5, '53	May 17, '80	Inspector of Surveys, Topographical Surveys Branch, Dept. of the Interior.
Belleau, Joseph Alphonse.....	".....	Sept. 30, '56	" 15, '83	Topographical Surveys Branch, Dept. of the Interior.
Bemister, George Bartlett.....	Winnipeg, Man.....		June 11, '78	M. L. S., Engineering Dept. C. N. R.
Bigger, Charles Albert.....	Ottawa, Ont.....	Aug. 15, '53	Mar. 30, '82	B. C. L. S., O. L. S., Assistant Superintendent Geodetic Survey.
Bingham, Edwin Ralph.....	Fort William, Ont.....	— '78	Oct. 25, '06	O. L. S.
Bolton, Lewis.....	Listowel, Ont.....	Jan. 4, '40	April 14, '72	"
Boswell, Elias John.....	Not known.....		Mar. 18, '03	" M. L. S.
Bourgeault, Armand.....	St. Jean Port Joli, Que.....	Feb. 23, '58	" 29, '83	Q. L. S.
Bourgault, Charles Eugene.....	".....	Sept. 6, '61	Feb. 21, '88	
Bourget, Charles Arthur.....	Lauzon, Que.....	Aug. 26, '51	May 14, '84	"
Bowman, Herbert Joseph.....	Berlin, Ont.....	June 18, '65	Feb. 16, '88	O. L. S.
Brabazon, Alfred James.....	Ottawa, Ont.....		May 13, '82	Boundary Survey, Dept. of the Interior.
Brady, James.....	Golden, B.C.....	Nov. 24, '40	April 14, '72	O. L. S., B. C. L. S.
Bray, Samuel.....	Ottawa, Ont.....	" 5, '46	Nov. 14, '83	O. L. S., Chief Surveyor, Dept. of Indian Affairs.
Bray, Lennox Thomson.....	Amherstburg, Ont.....	Mar. 14, '77	Feb. 18, '03	O. L. S.
Bridgland, Morrison Parsons.....	Calgary, Alta.....	Dec. 20, '78	Mar. 10, '05	
Broughton, George Henry.....	Penticton, B.C.....	Aug. 12, '86	June 3, '09	B. C. L. S.
Brown, Thomas Wood.....	Edmonton, Alta.....		" 21, '09	
Brownlee, James Harrison.....	Vancouver, B.C.....	Mar. 22, '56	April 15, '87	M. L. S., B. C. L. S.
Bucknill, Walter Birch.....	".....	May 8, '73	Mar. 19, '08	B. C. L. S.
Burke, William Robert.....	Not known.....		May 13, '86	
Burnet, Hugh.....	Victoria, B.C.....		June 22, '85	O. L. S., B. C. L. S.
Burwash, Nathaniel Alfred.....	Whitehorse, Y.T.....	Sept. 28, '79	Mar. 6, '07	O. L. S.
Burwell, Herbert Mahlon.....	Vancouver, B.C.....	Oct. 23, '63	Feb. 17, '87	B. C. L. S.
Campbell, Alexander Stewart.....	Kingston, Ont.....	Mar. 7, '80	Mar. 6, '09	
Carbert, Joseph Alfred.....	Medicine Hat, Alta.....	Feb. 4, '56	May 12, '80	O. L. S., District Engineer and Surveyor, Dept. of Public Works, Alberta.
Carpenter, Henry Stanley.....	Regina, Sask.....	" 8, '74	Feb. 20, '01	Dept. of Public Works, O. L. S.
Carroll, Cyrus.....	Prince Albert, Sask.....	Dec. 6, '34	April 14, '72	O. L. S.
Carson, Percy Alexander.....	Ottawa, Ont.....	" 25, '77	Feb. 22, '06	Topographical Surveys Branch, Dept. of the Interior.
Cautley, Reginald Hutton.....	Edmonton, Alta.....	" 6, '79	May 1, '05	
Cautley, Richard William.....	".....	Aug. 3, '73	Sept. 2, '96	
Cavana, Allan George.....	Orillia, Ont.....	Jan. 22, '58	Nov. 16, '76	O. L. S.
Charlesworth, Lionel Clare.....	Edmonton, Alta.....	Nov. 17, '73	Mar. 24, '03	O. L. S., Dept. of Public Works for Alberta.
Chilver, Charles Alonzo.....	Walkerville, Ont.....	Feb. 8, '83	Feb. 22, '07	
Christie, William.....	Prince Albert, Sask.....	" 13, '76	Mar. 22, '06	
Cleveland, Ernest Albert.....	Vancouver, B.C.....	May 12, '74	June 27, '99	B. C. L. S.
Coates, Preston Charles.....	Golden, B.C.....	" 16, '81	April 19, '07	"
Cokely, Leroy S.....	Merritt, B.C.....	Nov. 23, '84	Mar. 22, '10	
Côté, Joseph Adelard.....	Prince Albert, Sask.....	June 5, '64	May 14, '84	
Côté, Jean Léon.....	Edmonton, Alta.....	May 6, '67	Mar. 21, '90	
Cotton, Arthur Frederick.....	New Westminster, B.C.....	Aug. 8, '52	May 11, '80	O. L. S., B. C. L. S.



1 GEORGE V., A. 1911

## APPENDIX No. 10—Continued.

LIST of Dominion Land Surveyors who have been supplied with Standard Measures—Continued.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Craig, John Davidson. ....	Ottawa, Ont. ....	Jan. 30, '76	Feb. 24, '02	Boundary Surveys, Dept. of the Interior.
Cummings Alfred. ....	Fernie, B.C. ....	July 3, '80	Mar. 3, '09	B. C. L. S.
Cummings, John George. ....	Cranbrook, B.C. ....	Nov. 19, '73	Feb. 17, '04	"
Dalton, John Joseph. ....	Weston, Ont. ....	June 12, '54	April 17, '79	O.L.S., D.T.S.
Davies, Thomas Attwood. ....	Edmonton, Alta. ....		Feb. 22, '06	
Deans, William James. ....	Brandon, Man. ....	May 4, '60	May 13, '86	O.L.S.
Dennis, John Stoughton. ....	Calgary, Alta. ....	Oct. 22, '56	Nov. 19, '77	D.T.S.
Denny, Herbert C. ....	Not known. ....		April 1, '82	
Dickson, Henry Godkin. ....	Whitehorse, Y.T. ....	Mar. 29, '64	Mar. 19, '89	M.L.S.
Dickson, James. ....	Fenelon Falls, Ont. ....	Oct. 30, '34	April 14, '72	O.L.S.
Dobie, James Samuel. ....	Thessalon, Ont. ....	Oct. 15, '73	Mar. 22, '06	O.L.S.
Doupe, Jacob Lonsdale. ....	Winnipeg, Man. ....	Sept. 14, '67	Oct. 6, '88	M.L.S. Asst. Land Commissioner for C.P.R.
Drewry, William Stewart. ....	Nelson, B.C. ....	Jan. 20, '59	Nov. 14, '83	O.L.S., B.C.L.S.
Driscoll, Alfred. ....	Edmonton, Alta. ....	July 2, '65	Feb. 23, '87	B.C.L.S.
Drummond, Thomas. ....	Montreal, P.Q. ....	1856. ....	June 24, '76	D.T.S.
Ducker, William A. ....	Winnipeg, Man. ....	April 4, '52	Mar. 30, '83	O.L.S., M.L.S.
Dumais, Paul Thomas Concorde	Hull, P.Q. ....	Jan. 2, '47	" 29, '82	Q.L.S.
Edwards, George. ....	Ponoka, Alta. ....	June 13, '42	April 14, '72	O.L.S.
Ellacott, Charles Herbert. ....	Victoria, B.C. ....	Dec. 24, '66	Feb. 22, '99	B.C.L.S.
Empey, John Morgan. ....	Calgary, Alta. ....	April 16, '74	" 23, '05	O.L.S.
Fairchild, Charles Courtland. .	Brantford, Ont. ....	Feb. 21, '67	" 20, '01	O.L.S.
Farncomb, Alfred Ernest. ....	Lacombe, Alta. ....	May 22, '73	Mar. 12, '02	O.L.S.
Fawcett, Thomas. ....	Toronto, Ont. ....	Oct. 28, '48	Nov. 18, '76	O.L.S., D.T.S.
Fawcett, Adam. ....	Gravenhurst, Ont. ....		Feb. 22, '93	
Ferguson, George Hendry. ....	Toronto, Ont. ....	Jan. 20, '83	June 2, '09	
Findlay, Allan. ....	Winnipeg, Man. ....	Oct. 15, '80	Mar. 21, '08	
Fontaine, Louis Elie. ....	Levis, P.Q. ....	" 3, '68	Nov. 30, '92	
Francis, John. ....	Portage la Prairie, M	Dec. 22, '52	June 17, '75	M.L.S.
Garden, James Ford. ....	Vancouver, B.C. ....	Feb. 19, '47	May 13, '80	B.C.L.S.
Garden, George H. ....	Lethbridge, Alta. ....		April 14, '72	Deputy Surveyor for N.B.
Garden, Charles. ....	Not known. ....		" 14, '72	" "
Garner, Albert Coleman. ....	S. Qu Appelle, Sask.	Sept. 6, '78	May 27, '07	
Gauvreau, Louis Pierre. ....	Not known. ....		April 14, '72	
Gibbons, James. ....	Dawson, Y.T. ....	June 25, '60	Feb. 12, '91	O.L.S.
Gordon, Maitland Lockhart. .	Vancouver, B.C. ....		" 18, '04	B.C.L.S.
Gordon, Robert John. ....	Lethbridge, Alta. ....	June 18, '69	Mar. 12, '02	
Gore, Thomas Sinclair. ....	Victoria, B.C. ....	1852. ....	April 19, '79	B.C.L.S.
Green, Alfred Harold. ....	Nelson, B.C. ....	Jan. 20, '79	Feb. 23, '05	B.C.L.S.
Green, Thomas Daniel. ....	Prescott, Ont. ....	Dec. 21, '57	May 19, '84	O.L.S.
Green, F. C. ....	Nelson, B.C. ....			B.C.L.S.
Grover, George Alexander. ....	Norwood, Ont. ....		Feb. 18, '04	
Hamilton, James Frederick. .	Lethbridge, Alta. ....		June 2, '09	
Harris, John Walter. ....	Winnipeg, Man. ....	Feb. 26, '45	April 14, '72	O.L.S., M.L.S., City Surveyor.
Harvey, Charles. ....	Kelowna, B.C. ....	May 5, '76	Feb. 17, '04	B.C.L.S.
Hawkins, Albert Howard. .	Listowel, Ont. ....	July 27, '62	Mar. 6, '06	
Heaman, John Andrew. ....	Winnipeg, Man. ....	June 3, '75	July 15, '09	O.L.S.
Heathcott, Robert Vernon. ....	Edmonton, Alta. ....	July 7, '81	May 13, '07	
Henderson, Walter. ....	Not known. ....		Nov. 17, '83	
Holcroft, Herbert Spencer. ....	Toronto, Ont. ....	Sept. 4, '77	Feb. 18, '03	O.L.S.
Hopkins, Marshall Willard. .	Edmonton, Alta. ....	May 24, '61	" 20, '01	O.L.S.
Hubbell, Ernest Wilson. ....	Ottawa, Ont. ....	Nov. 5, '62	May 19, '84	Inspector of Surveys, Topographical Surveys Branch, Dept. of Interior.
James, Silas. ....	Toronto, Ont. ....	June 19, '34	April 14, '72	O.L.S.
Jephson, Richard Jermy. .	Brandon, Man. ....	Feb. 5, '54	May 12, '80	O.L.S., B.C.L.S.
Johnson, Alfred William. ....	Kamloops, B.C. ....	" 23, '74	Mar. 12, '02	B.C.L.S.
Kimpe, Maurice. ....	Edmonton, Alta. ....	Jan. 17, '76	May 13, '07	
King, William Frederick. ....	Dominion Observatory, Ottawa, Ont.	Feb. 19, '54	Nov. 21, '76	D.T.S., Chief Astronomer, Dept. of Interior.
Kirk, John Albert. ....	Summerland, B.C. ....	Jan. 9, '54	May 11, '80	O.L.S., B.C.L.S.
Kitto' Franklin Hugo. ....	Ottawa, Ont. ....	Mar. 28, '80	Mar. 6, '08	Topographical Surveys Bh., Dept. of Interior.



SESSIONAL PAPER No. 25b

## APPENDIX No. 10—Continued.

LIST of Dominion Land Surveyors who have been supplied with Standard Measures—Continued.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Klotz, Otto Julius.....	Dominion Observatory, Ottawa, Ont.	Mar. 31, '52	Nov. 19, '77	O.L.S., D.T.S., Astronomer, Dept. of Interior.
Knight, Richard H. ....	Edmonton, Alta....	June 7, '77	Feb. 18, '04	
Latimer, Frank Herbert.....	Penticton, B.C.....	May 23, '60	Nov. 13, '85	
Laurie, Richard C.....	Battleford, Sask....	Jan. 31, '58	April 27, '83	
Lawe, Henry.....	Ottawa, Ont.....	Feb. 28, '38	" 14, '72	O.L.S., M.L.S. Topographical Surveys Branch, Dept. of Interior.
Lemoine, Charles Ercl .....	Ville Montcalme, P.Q.		Mar. 31, '82	Q.L.S.
Lendrum, Robert Watt.....	Strathcona, Alta....	July 24, '34	May 15, '80	O.L.S.
Lighthall, Abram .....	Vankleek Hill, Ont.	Mar. 30, '78	Dec. 25, '09	
Lonergan, Gerald Joseph.....	Buckingham, P.Q....	Oct. 8, '71	Feb. 28, '01	Q.L.S. Inspector of Surveys, Dept. of Interior.
Lumsden, Hugh David.....	Ottawa, Ont.....	Sept. 7, '44	Apr. 14, '72	O.L.S.
MacLennan, Alexander L.....	Toronto, Ont.....	May. 10, '78	Feb. 23, '05	
MacPherson, Charles Wilfrid..	Dawson, Y.T.....	Sept. 6, '71	Mar. 7, '00	O.L.S. Director of Surveys, Y.T.
Magrath, Charles Alexander...	Lethbridge, Alta....	April 22, '60	Nov. 16, '81	B.A.Sc., O.L.S., B.C.L.S., D.T.S.
Meadows, William Walter.....	Maple Creek, Sask..	May 27, '73	Feb. 23, '05	O.L.S.
Miles, Charles Falconer..	Toronto, Ont. ....	Jan. 30, '38	Apr. 14, '72	O.L.S. Inspector of Surveys, Dept. of Interior.
Moberly, Hardford Kenneth...	Moosomin, Sask....	— '69	" 21, '03	
Molloy, John.....	Winnipeg, Man.....	Jan. 13, '40	" 14, '72	M.L.S.
Montgomery, Royal Harp.....	Prince Albert, Sask.	May 20, '82	Feb. 23, '05	O.L.S.
Moore, Herbert Harrison.....	Calgary, Alta. ...	Dec. 1, '69	" 17, '04	
Morrier, Joseph Eldedge.....	Ottawa, Ont.....	Aug. 29, '74	May 16, '07	
McArthur, James Joseph.....	Ottawa, Ont.....	May 9, '56	Apr. 17, '79	Boundary Survey, Dept. of Interior.
McColl, Gilbert Beebe.....	Winnipeg, Man.....	Oct. 3, '82	Mar. 20, '07	M.L.S., D.T.S.
McDiarmid, Stuart Stanley....	Vancouver, B.C.....	Aug. 4, '81	Feb. 23, '05	B.C.L.S.
McFadden, Moses.....	Vancouver, B.C.....	Aug. 26, '26	Apr. 14, '72	O.L.S., M.L.S.
McFarlane, Walter Graham...	Toronto, Ont.....	Sept. 28, '75	May 19, '05	
McFarlane, John Baird.....	Claremont, Ont.....	Feb. 25, '79	June 3, '08	
McFee, Angus.....	Red Deer, Alta....	July 14, '46	Apr. 19, '79	
McGrandle, Hugh.....	Wetaskiwin, Alta...	Mar. 12, '57	Mar. 30, '83	O.L.S.
McKenna, John Joseph.....	Dublin, Ont.....		Apr. 14, '72	O.L.S.
McKenzie, John .....	New Westminster, B.C.	Oct. 31, '47	Nov. 18, '87	
McLean, James Keachie .....	Ottawa, Ont.....	Dec. 19, '51	Apr. 1, '82	O.L.S. Dept. of Indian Affairs.
McMillan, George.....	Finch, Ont.....	Dec 9, '69	Feb. 22, '06	
McNaughton, Alexander L ...	Cornwall, Ont .....	Sept. 30, '81	Feb. 23, '05	O.L.S., B.C.L.S.
McPherson, Archibald John...	Regina, Sask .....	— '70	Feb. 21, '01	
McPhillips, George.....	Winnipeg, Man.....	Apr. 26, '48	Jan. 17, '75	O.L.S., M.L.S.
McVittie, Archibald W.....	Victoria, B.C.....	May 5, '58	Mar. 30, '82	B.C.L.S.
Nash, Thomas Sanford.....	Ottawa, Ont.....	July 2, '75	Feb. 18, '04	Topographical Surveys Branch, Dept. of Interior
Ogilvie, William.....	Ottawa, Ont.....	April 7, '46	Apr. 14, '72	O.L.S.
O'Hara, Walter Francis.....	Ottawa, Ont .....		Feb 19, '95	O.L.S.
Ord, Lewis Redman. ....	Hamilton, Ont.....	Oct. 17, '56	Apr. 1, '82	O.L.S.
Parsons, Johnstone Lindsay R.	Regina, Sask.....	Jan. 18, '76	Feb. 23, '05	O.L.S.
Patrick, Allan Poyntz.....	Calgary, Alta....	July 18, '49	Nov. 19, '77	B.C.L.S., D.T.S.
Patten, Thaddeus James.....	Little Current, Ont..	Feb. 4, '59	Mar. 29, '83	O.L.S.
Pearce, William.....	Calgary, Alta....	Feb. 1, '48	May 10, '80	O.L.S., B.C.L.S.
Peters, Frederic Hatheway...	Calgary, Alta. ...	Nov. 4, '83	March 4, '10	Hydrographic Surveys, Dept. of Interior.
Phillips, Edward Horace.....	Saskatoon, Sask. ...	Dec. 19, '78	Feb. 24, '02	
Plunkett, Thomas Hartley.....	Meaford, Ont.....	June 1, '78	Mar. 12, '08	
Ponton, Archibald William...	Edmonton, Alta ...	Jan. 25, '59	May 18, '81	O.L.S.
Proudfoot, Hume Blake.....	Saskatoon, Sask....	June 23, '58	Mar. 28, '82	O.L.S.
Rainboth, Edward Joseph.....	Ottawa, Ont.....		May 19, '81	Q.L.S., O.L.S.
Rainboth, George Charles.....	Ottawa, Ont.....	Oct. 4, '46	Apr. 14, '72	Q.L.S., O.L.S. Boundary Surveys, Dept. of Interior
Reid, John Lestock .....	Prince Albert, Sask.	Sept. 12, '41	Apr. 14, '72	Dept. of Indian Affairs.
Reilly, William Robinson.....	Regina, Sask.....	Aug. 10, '57	Nov. 17, '81	O.L.S., M.L.S.



APPENDIX No. 10—*Concluded.*

LIST of Dominion Land Surveyors who have been supplied with Standard Measures—*Concluded.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Richard, Joseph Francois.....	Ste Anne de la Pocatiere, P.Q.	.....	May 13, '82	
Rinfret, Raoul.....	Montreal, P.Q.....	July 16, '56	Feb. 20, '00	Q.L.S.
Ritchie, Joseph Frederick. ....	Prince Rupert, B.C.	May 23, '63	Jan. 7, '89	B.C.L.S.
Roberston, Henry H.....	N. Temiskaming, P. Q.	Sept. 13, '47	Apr. 14, '72	Q.L.S.
Roberts, Sydney Archibald....	Victoria, B.C.....	April 10, '48	May 16, '85	B.C.L.S.
Roberts, Vaughan Maurice....	Goderich, Ont.....	Mar. 22, '64	" 17, '86	
Robinson, Ernest Walter P....	Ottawa, Ont.....	May 8, '80	" 1, '08	
Robinson, Franklin Joseph....	Regina, Sask.....	Oct. 20, '70	Feb. 20, '00	
Rolfson, Orville.....	Walkerville, Ont.....	Feb. 26, '85	July 11, '98	
Rombough, Marshall Bedwell..	Morden, Man.....	Oct. 14, '35	April 14, '72	M.L.S.
Rorke, Louis Valentine.....	Toronto, Ont.....	Feb. — '65	Aug. 13, '91	O.L.S. Inspector of Surveys for Ontario.
Ross, George.....	Welland, Ont.....	June 12, '53	Nov. 21, '82	O.L.S.
Ross, Joseph Edmund.....	Kamloops, B.C.....	Jan. 9, '61	Feb. 12, '91	O.L.S., B.C.L.S.
Roy, George Peter.....	Quebec, P.Q.....	Oct. 1, '52	Nov. 17, '81	Q.L.S.
Saint Cyr, Jean Baptiste.....	Montreal, P.Q.....	" 17, '66	Feb. 17, '87	Q.L.S.
Saint Cyr, Arthur.....	Ottawa, Ont.....	Nov. — '60	" 17, '87	
Saunders, Bryce Johnston.....	Edmonton, Alta.....	.....	Nov. 16, '84	O.L.S.
Scott, Walter Alexander.....	Galt, Ont.....	Aug. 8, '85	Mar. 16, '09	
Seager, Edmund.....	Kenora, Ont.....	Nov. 22, '38	April 14, '72	O.L.S.
Selby, Henry Walter.....	Toronto, Ont.....	Aug. 24, '54	Nov. 15, '82	O.L.S.
Sewell, Henry DeQuincy.....	" ".....	April 18, '48	May 16, '85	O.L.S.
Seymour, Horace Llewellyn....	Edmonton, Alta.....	June 11, '82	Feb. 22, '06	O.L.S.
Shaw, Charles Aeneas.....	Greenwood, B.C.....	Nov 16, '53	May 10, '80	O.L.S., B.C.L.S.
Sheply, Joseph Drummond....	N. Battleford, Sask..	Sept. 13, '79	Mar. 12, '06	
Smith, Charles Campbell.....	Ottawa, Ont.....	Jan. 1, '73	Feb. 22, '06	O.L.S.
Speight, Thomas Bailey.....	Toronto, Ont.....	Feb. 8, '59	Nov. 16, '82	O.L.S.
Starkey, Samuel M.....	Codys, Queen's Co., N.B.	Sept. 4, '37	April 14, '72	
Steele, Ira John.....	Ottawa, Ont.....	April 6, '81	April 16, '08	
Stewart, Elihu.....	Collingwood, Ont....	Nov. 17, '44	" 14, '72	O.L.S.
Stewart, Will Malcolm.....	Saskatoon, Sask.....	" 26, '84	June 6, '07	
Stewart, Louis Beaufort.....	Toronto, Ont.....	Jan. 27, '61	Nov. 22, '82	O.L.S., D.T.S.
Stewart, George Alexander....	.....	.....	April 14, '72	O.L.S.
Stock, James Joseph.....	Ottawa, Ont.....	Aug. 16, '87	Mar. 2, '10	
Talbot, Albert Charles.....	Calgary, Alta.....	April 5, '56	May 13, '80	
Taylor, Alexander.....	Portage la Prairie, Man.	Aug. 6, '75	June 9, '04	M.L.S.
Teasdale, Charles Montgomery.	Concord, Ont.....	Oct. 18, '79	Mar. 9, '06	
Thompson, William Thomas....	Grenfell, Sask.....	Nov. 1, '53	Nov. 19, '77	D.T.S.
Tracy, Thomas Henry.....	Vancouver, B.C.....	June 25, '48	April 14, '72	O.L.S., B.C.L.S.
Tremblay, Alfred Joseph.....	Les E boulements, P.Q.	.....	Feb. 18, '90	
Turnbull, Thomas.....	Winnipeg, Man.....	May 26, '57	Mar. 29, '82	O.L.S.
Tyrrell, James William.....	Hamilton, Ont.....	" 10, '63	Feb. 16, '87	O.L.S.
Vaughan, Josephus Wyatt.....	Vancouver, B.C.....	Oct. 17, '45	June 11, '78	B.C.L.S.
Vicars, John Richard Odium..	Kamloops, B.C.....	April 16, '65	May 17, '86	O.L.S., B.C.L.S.
Waddell, William Henry.....	Edmonton, Alta.....	Mar. 23, '83	Mar. 25, '07	O.L.S.
Waldron John.....	Pine Grove, Ont.....	Aug. 1, '72	April 2, '07	
Walker, Ernest Ward.....	Regina, Sask.....	Dec. 26, '75	Mar. 27, '07	
Wallace, James Nevin.....	Calgary, Alta.....	Aug. 21, '70	Feb. 20, '00	O.L.S.
Warren, James.....	Walkerton, Ont.....	Nov. 7, '37	April 14, '72	
Watt, George Herbert.....	Ottawa, Ont.....	Feb. 5, '76	Feb. 24, '02	
Weekes, Abel Seneca.....	Edmonton, Alta.....	" 17, '66	" 11, '92	
Weekes, Melville Bell.....	Regina, Sask.....	Nov. 28, '74	" 18, '03	O.L.S.
Wheeler, Arthur Oliver.....	Calgary, Alta.....	May 1, '60	Nov. 21, '82	O.L.S., B.C.L.S.
White-Fraser, George W. R. M.	Ottawa, Ont.....	'61	Feb. 21, '88	D.T.S.
Wiggins, Thomas Henry.....	Saskatoon, Sask.....	Aug. 24, '63	" 18, '96	O.L.S.
Wilkins, Frederick W. B.....	Norwood, Ont.....	June 27, '54	May 18, '81	O.L.S., D.T.S.
Wilkinson, William Downing..	Not known.....	.....	Feb. 22, '93	
Williams, Guy Lorne.....	Enderby, B.C.....	Mar. 3, '79	June 24, '08	B.C.L.S.
Woods, Joseph Edward.....	Pincher Creek, Alta.	Oct. 13, '61	Nov. 14, '85	
Young, Walter Beatty.....	Winnipeg, Man.....	July 6, '80	Mar. 25, '05	M.L.S.
Young, William Howard.....	Lethbridge, Alta.....	June 8, '78	May 17, '07	



# REPORTS OF SURVEYORS







**GENERAL REPORTS OF SURVEYORS****1909-1910****APPENDIX No. 11.****EXTRACTS FROM THE REPORT OF C. F. AYLSWORTH, JR., D.L.S.****RESURVEYS IN SOUTHERN MANITOBA.**

On April 21, with my party, I left Winnipeg for St. Laurent, where my outfit had been wintered. St. Laurent has not grown much during the past ten years, but since it has secured railway facilities the people in the locality predict prosperity, especially as it is proving a very popular summer resort for the citizens of Winnipeg.

We left St. Laurent with the outfit on April 26, for township 9, range 10, west of the principal meridian, where we arrived on May 1, with about nine inches of snow on the ground and the weather bitterly cold.

The original survey of this township was completed over thirty years ago, and the corners were marked by wooden posts. These posts gradually decayed or were burned making it almost impossible to locate parcels of land. The Canadian Northern railway runs across the north end of this township, but the business centre of the district is Treherne, on the Canadian Pacific railway, in township 8. The manager of the Bank of Commerce there informed me that the financial condition of the farmers in the vicinity was good. They raise good horses and cattle and have well-graded roads throughout the district.

The traverse of both banks of Assiniboine river through this township occupied nearly twenty days, and the resurvey was completed on July 29. The following day we moved to township 12, range 7, east of the principal meridian. The work in this township consisted of investigating the dispute over the boundaries of the quarter sections in section 35. This having been satisfactorily accomplished, we proceeded to township 15, range 3, west of the principal meridian, arriving there on August 19.

We reached township 8, range 13, west of the principal meridian on September 30 and completed the resurvey on December 6, having traversed both banks of Assiniboine river through it.



## APPENDIX No. 12.

## EXTRACTS FROM THE REPORT OF P. R. A. BELANGER, D.L.S.

## MISCELLANEOUS RESURVEYS IN MANITOBA AND INSPECTION OF CONTRACTS.

I left home on March 16 for Winnipeg and on April 6 I started with the whole party for Sandy Lake village where I began inspection work. Sandy Lake is the name of a small village on the Rossburn section of the Canadian Northern railway; it is situated in the Riding mountains at the south end of the lake. It is claimed to be a fine summer resort and a few families are already in the habit of spending their holidays there under canvas during the warm season. The inhabitants of the surrounding settlement are mostly all foreigners who are progressing very favourably and appear contented with their lot.

From Sandy Lake I proceeded by rail to Makinak from where I continued inspection until May 11.

Early on the morning of May 11, I boarded the train at Makinak for Oak Point where I organized my transport outfit and left that place on the 17th for Fairford settlement.

At Fairford my work consisted of the retracement of part of the old settlement survey by Mr. Martin. This survey was found badly obliterated, and it was only by mere luck that I found blazing on a lot line which had been disputed in the past, and subsequently blazed. By reopening this line, between blazing and measuring from Fairford river the distance shown on the old plan for the length of the line, I located a stub of a post at the bottom of a very small marshy coulee, marking the intersection of the rear line of the settlement from this stub by turning the bearing of the rear line, and measuring one lot westerly I located another stub and with the help of these two marks I was enabled to resurvey the settlement and reestablish all the marks and lines which everywhere were found entirely obliterated; the only traces of lines I found were old stumps here and there, indicating that a line had probably been run there in the past.

All lots were laid out and surveyed according to the dimensions shown on the original plan, and almost everywhere the distances found on side lines of lots proved to be about the same as in the original survey. This would indicate that the old survey was accurately retraced notwithstanding the absence of old marks. All lines I retraced were thoroughly blazed and permanently marked by posts and mounds and all interested parties appeared satisfied. Principal among these was the Rev. Mr. Bruce who was rather under a false impression with regard to the position of the metes and bounds of his lot, which lot I surveyed for him according to the patent issued in his favour.

This settlement is nicely situated on both banks of Fairford river which is the great outlet of lakes Winnipegosis and Manitoba and the inlet of lake Winnipeg, after passing through lake St. Martin. It is mostly inhabited by half-breeds whose occupation is fishing and hunting; some of them also work at the gypsum mines which are situated a short distance north of the settlement. I am informed that the Oak Point branch of the Canadian Northern railway will pass through this place en route to Gypsumville. This railway would replace the boat service and help in developing the mines on a larger scale.

I performed the inspection of contracts in this vicinity which kept me busy until June 15, and the next day I took my outfit across Fairford river and started



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back to Oak Point where I arrived on the 21st, and after leaving my horses in pasture and the outfit in care of Mr. Seller of that place I boarded the train with the party for Winnipegosis which was reached on the 24th.

Here I organized a sailboat transport to examine contract surveys scattered along the shores of lakes Winnipegosis and Manitoba.

On July 1, everything being in readiness, I set sail from Winnipegosis for Pine Creek settlement, which I reached on the same evening at nine o'clock, after a safe voyage.

Before going on with inspection I attended to the retracement of the survey of Pine Creek settlement of which the post-office name is 'Camperville;' this is a small settlement situated on the west shore of lake Winnipegosis adjoining an Indian Reserve. It is inhabited by half-breeds who make their living by fishing, trapping, or in some other way; they do not care for farming. The only lot which has been partly cleared out belongs to the Roman Catholic mission which is already making use of the clearing by keeping in it a good herd of cows for their milk supply.

There is a fine boarding school here under the direction of the Rev. Oblats Fathers.

From Pine Creek settlement I sailed to different places on lake Winnipegosis such as Red Deer point, Salt point, Salt Springs, Devil's island, &c. All those places were visited for the purpose of carrying on inspection and to survey a few lines which had been omitted at the time of subdivision and also to establish the true location of the salt springs.

I sailed next day to Oak Point which I reached on August 24. Here again I secured my horses and outfit and left the next day for Selkirk and thence to Grandmarais point, where my work consisted of the survey of villa lots in township 18, range 7, east of the principal meridian, and the retracement of a few section lines in connection with that survey. These lots numbering about forty-five are all nicely situated on the east shore of lake Winnipeg; some of the lots lie on a peninsula formed by a bay which connects with the lake by a narrow channel about four chains wide and four feet deep at low water. This bay affords a splendid harbour for safe boat sailing at any time.

The large sandy beach extending in shallow water for some distance into the lake in front of these lots should make the place very attractive for a summer resort, and I have no doubt that the lots will sell as soon as they are placed on the market, principally those on section 33 which are situated along a bank or plateau rising from twelve to about sixty feet above the lake. Those on section 19 lie on the above mentioned peninsula formed by the drifted sand of the lake beach, and though their position is more picturesque, the annoyance caused on windy days by the drifting sand will hinder their sale; however, this inconvenience can be remedied by covering the ground with grass sod and planting trees specially adapted to such soil.

On September 21, having finished the survey of villa lots at Grandmarais point, I moved camp to Mitasa point and after spending four days at that place examining two townships, I proceeded to township 18, range 11, east of the principal meridian, where I completed the inspection.

While continuing inspection work I passed through Fort Alexander and the settlement of St. George which is situated along both banks of Winnipeg river a few miles from its mouth and adjoining the Indian reserve which extends southerly from the mouth of the river.

St. George is settled by French-Canadians who had the courage some twenty years ago to take the heavy timbered land they occupy, and by perseverance and hard work they succeeded in clearing and improving their land, and made a home where they live happy and contented. All they desire now is the building of a railway from Lac-du-Bonnet to Fort Alexander to give them access to the Winnipeg market at any time of the year. The only way to get out of this place in summer is by



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boat to Selkirk via Winnipeg river and lake Winnipeg, or up the river to Lac-du-Bonnet.

On October 9 I proceeded to Rennie for the inspection of contract surveys in that vicinity which kept me busy until November 3.

I next proceeded via Teulon to township 18, range 1, east of the principal meridian where I made an investigation with regard to the necessity of resurveying the township, and then continued my journey northerly along the colonization road, where I destroyed some mounds that were considered unnecessary.

I continued inspection of contract surveys until December 27, when I was compelled by deep snow to close operations for the season.

While at Winnipeg on my return home I inspected the iron posts made by the Manitoba Bridge and Iron Works, Ltd., and by the Vulcan Iron Works, for Messrs. Brown and Mitchell, of Brandon, contractors. Separate reports have been already submitted to you in connection with the inspection of these posts.

Detailed reports were also made during the season on the inspection of each contract, and I only wish to mention the fact that the rigid inspections made in the past have greatly benefitted both the Department and the contractors. The surveys have been improved to a great extent, and one contractor who was considered careless before, fulfilled his contract this year with such care and attention that I was highly pleased to recommend the acceptance of his survey without any restriction.

During my work along lake Winnipegosis I noticed that the salt claims which had been located and worked for a time had been abandoned. I was unable to state the reason for this action, but while at Pine Creek settlement I remarked that at the Roman Catholic mission they had bored two artesian wells and found the water so saline that it could not be used except for the purpose of preserving fish during the summer.

I did not meet with any mineral during the course of my operations.

The rivers and lakes noticed on my surveys still abound with fish furnishing employment and nourishment for the half-breeds, Indians and settlers in that vicinity, besides the great fishing which is done in winter by the large fish companies for exportation.

Feathered game appears to be decreasing, most likely due to the destruction by the 'nimrods' who become more numerous as population increases. Large game on the contrary appeared more abundant as I saw more moose and larger herds of elk than I ever saw before, and though I was provided with hunting licenses I was unable to secure any as the great depth of snow which fell at the open season prevented me as well as others from securing them in a legal way, the consequence being that very few were killed this year, though many were killed in an unlawful manner before the open season.



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## APPENDIX No. 13.

## REPORT OF P. A. CARSON, D.L.S.

## TRIANGULATION SURVEYS IN THE RAILWAY BELT OF BRITISH COLUMBIA.

OTTAWA, ONT., February 8, 1910

E. DEVILLE, Esq., LL.D.,  
Surveyor General,  
Ottawa.

SIR,—I have the honour to submit the following report of my field operations during the past season on the triangulation survey in the railway belt of British Columbia, in connection with the Trigonometrical section of the Topographical Survey of Canada.

I left Ottawa on June 8, for Golden, British Columbia, where I had stored my outfit the previous autumn, and after making up my party, I proceeded by rail to Revelstoke. Thence we went up Columbia river by trail to Carnes creek, a rapid mountain stream some twenty-five feet wide, flowing into the Columbia from the east about twenty-six miles above Revelstoke. The mouth of this creek is about a quarter of a mile north of the limit of the railway belt. Columbia river in this vicinity is very rapid, but is navigated by a wonderful flat-bottomed steamboat, which with enormous boilers and powerful machinery, manages to navigate the rapids and canyons. This boat plies from Revelstoke to Downie creek, a distance of forty-five miles, carrying supplies to the mines and lumber camps of that district. There is a wagon road from Revelstoke to Mosquito landing, a distance of six miles; then an old trail leads up the east side of the river to 'big bend'. This trail is not much used now and is in a rather bad condition. There is some good timber, consisting of cedar, spruce, hemlock and fir, along both sides of the river, extending high up on the mountains. The low lands are suitable for fruit growing, but the clearing of it will be a herculean task on account of the heavy timber. The valley itself is rather narrow, with, however, some good bench lands higher up. The mountains on each side of the river are low, rising only to an elevation of six or seven thousand feet with higher peaks several miles back.

About four miles from its mouth Carnes creek divides into the north and south forks, the former coming from the direction of Standard basin and Downie creek, while the south fork, which lies wholly within the railway belt, heads from the same snow fields as Silver, Laforme and Clachnacudainn creeks. An old pack trail leads up to the north side of Carnes creek to the forks, crossing the northerly stream by a bridge and following the south fork for a distance of two miles to some undeveloped mining claims. A branch trail also ascends the west bank of the north fork towards Standard basin, while at the bridge a third trail climbs Rosebery mountain with numerous switchbacks to the old deserted Rosebery mine, at an elevation of six thousand feet.

I set two stations in this vicinity, one on Rosebery mountain (elevation 8,000 feet), and the other on Carnes mountain (elevation 8,000 feet), reading angles therefrom and taking photographs for mapping purposes.

A topographical map has been prepared of this mountainous district, extending northeasterly to connect with my map of the previous season.



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From Carnes creek I returned to Revelstoke and moved to Twin Butte railway station, eleven miles east of Revelstoke. On account of the position of Albert peak, we were obliged to ascend to timber line with a light camping outfit, climbing from Twin Butte bridge up the ridge projecting between the railway and East Twin creek. If Lord Byron had made this trip through dirty windfall and burnt timber I am perfectly sure he would never have uttered that beautiful line 'There is a pleasure in the pathless woods.' From timber line we ascend North Albert peak, the summit of which on this date (July 9) was covered with deep snow. Station XXVII. was consequently placed on a projecting and adjoining creek slightly lower than the main summit at an elevation of 9,300 feet.

We next moved to Albert Canyon railway station and followed the trail leading up the north fork of Illecillewaet river. This trail is the remnants of the sometime wagon road, fearfully and wonderfully made, leading to the defunct Waverley and Tangier mines, whose unlaid ghosts still scare nervous capital from British Columbia. We advanced fifteen miles up the river to 'the farm,' from where we ascended Cornice mountain (elevation 9,000 feet) and occupied station XXVI. During the descent of this mountain we encountered four caribou, two black bears and a huge grizzly within the space of half an hour.

From 'the farm' we proceeded for twelve miles up the old wagon road, which follows the east or left side of the river, until we reached a broad level pass (elevation 5,700 feet) between the heads of the north fork of Illecillewaet river and Downie creek. On the Downie slope, about a thousand feet below the pass, lay the old deserted buildings of the Waverley and Tangier mines, now frequented only by legions of porcupines.

On the summit of Sorcerer mountain (elevation 10,500 feet), which lies on the northeasterly side of the pass, I established station XXXI. This mountain is one of the most commanding peaks in this locality, and is rather difficult to scale. On account of the depth of snow on the summit, I was unable to cement the brass bolt in the rock, but I placed it temporarily in the centre of the cairn.

On the flat pass I ran a base line sixty-eight chains long, and by means of three secondary stations connected station XXXI. with one of the survey posts of the Tangier group, thus locating the position of these mines relative to the Dominion system of surveys and the north limit of the railway belt.

The return trip to Albert Canyon was made in two days, when we moved to Bear Creek railway station, and went up the Beaver river trail to Grand glacier, near the pass between Beaver and Duncan rivers. We ascended Grand glacier and established station XXIV. on Grand mountain, lying between the two forks of the glacier (elevation 10,000 feet). This station takes the place of the one placed on Sugarloaf mountain in 1907, which was unsuitable for a station on account of the great depth of snow. The ascent of Grand mountain (August 7) was very disagreeable, especially crossing the enormous crevasses of the upper glacier, it being necessary in some cases to descend a couple of hundred feet into ice tunnels and caves to attain the higher reaches of the glacier.

From our camp at Grand glacier we retraced our steps down the Beaver river trail for seven miles to a point opposite Bald mountain. Here we took horses up the steep face of Bald mountain, reaching the prairie-like summit in four hours, ascending over 3,000 feet at a fifty per cent slope. We nooned on the top of Bald mountain, and in the afternoon descended the easterly slope to the valley of the north fork of Spillimacheen river. By making this forced march over Bald mountain I was saved the hard trip up Grizzly creek, or the long journey *via* Carbonate Landing and the north fork trail.

We ascended to station XXII. and read angles there on two successive days, August 12 and 13. Forest fires by this time were raging in the mountainous districts,



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and the smoke therefrom was very dense, especially in the direction of Duncan river and the Arrow lakes.

I also established a station, No. XXII. A, in the valley of the north fork of Spillimacheen river, and marked the point with a wooden post and stone mound. This reference station should prove useful for commencing new surveys in this valley, there being no posts of the Dominion lands survey system in the vicinity. I also occupied and established the position of three of Mr. A. O. Wheeler's stations, viz.: XXII. B (Wheeler's Bald mountain cairn), XXII. C (Wheeler's Spillimacheen cairn), and XXII. D (Wheeler's Grand glacier station).

The return journey was made down Bald mountain to the Beaver valley and thence back to Bear Creek railway station, when a move was made to Flat Creek siding.

We ascended the trail up Flat creek some seven miles to the pass between that stream and Slick creek. Here we were laid up for several days with heavy rains, and when the weather cleared we took packs on our shoulders, went over Mt. Oliver, on the east side of the pass, and camped near the southerly base of Mt. Bonney. We then ascended to station XXV. (Mt. Bonney, elevation 10,200 feet) by the same route as in 1906. During the occupation of this station very cold winds prevailed, and the work was also retarded by smoke.

On moving to Six-mile Creek siding we ascended to timber line on the Esplanade range as in 1908, and camped at Sunbeam lake, at the head of Spinster creek. From this camp I occupied station XXX. (Cherub Mt.), station XXX. A (Cupola Mt.), Station XXX. B (Sentry Mt.), and station XXX. E.

We then returned to Six-mile Creek siding and moved to Beavermouth to visit station XXIII. Here we were delayed several days by bad weather. I connected station XXIII. with the Dominion system of surveys, by tying this station to the iron post marking the northeast corner of section 34, township 29, range 25, west of the fifth meridian.

At Beavermouth Mr. de la Condamine, who was assistant to Mr. T. H. Plunkett, D.L.S., this season, was transferred to my party to assist in the measuring of the Kootenay base with the invar apparatus. On completing the occupation of station XXIII. we moved to Golden on October 3, and there examined the base line apparatus. We then moved up the Columbia valley to the base to proceed with its measurement. This work occupied us from October 21 to November 8, a detailed account of the measurement and the use of the invar apparatus being given hereinafter. On account of only twenty-four metre wires being available for measuring purposes it was necessary to alter the position of one end of the base in order to make the line an integral number of twenty-four metre stretches. This alteration necessitated the reoccupation of stations A, C and D.

The mountain survey season of 1909 was moderately dry on the whole and the triangulation work was not retarded any more than usual by continuous rains. In the month of August, however, considerable delay was experienced from smoke. High winds prevailed during the entire season, which also interfered with the work and as well caused us great physical discomfort on the peaks.

During the latter half of June, in the vicinity of Columbia river, north of Revelstoke, we had rainy weather on eight days. In the month of July, in the Illecillewaet valleys, there were fifteen rainy days, fourteen fine and two cloudy. In August in the valleys of the Beaver and Incomappleux rivers there were nineteen fine days, ten rainy, and two cloudy, with dense smoke during the greater portion of the month. During September, in the vicinity of Beavermouth and Gold creeks, rain fell on eleven days, nine were fine and two cloudy. In the upper Columbia valley the month of October was rather peculiar, nearly the entire month being cloudy in the day time, with rain at night. On the few fine days a dense fog filled the valley most of the day. On November 5 permanent snow fell in the Columbia valley.



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## THE MEASUREMENT OF KOOTENAY BASE WITH INVAR WIRES.

Kootenay base controls the complete network of the triangulation survey in the railway belt, British Columbia, from the summit of the main range of the Rocky mountains westward to the Cascade range. This base was laid out and its terminal points established in 1907, but no precise base measuring apparatus was available for its determination until 1909, when three twenty-four metre wires and the necessary auxiliary apparatus was finally received from the International Bureau of Weights and Measures.

The many parts of the apparatus were all repacked at Ottawa in strong trunks, specially designed, and the instrument shipped to British Columbia, where the measurements were taken in the month of October, after the climbing season had closed.

For the complete manual on the theory of invar and the description of the base line apparatus reference should be made to 'La Mesure Rapide des Bases Géodésiques' (4th edition) by J. René Benoit and Ch-Ed. Guillaume, of the International Bureau of Weights and Measures. It has been considered advisable, however, to give in connection with this report a brief discussion on the theory and peculiarities of that strange alloy of nickel and steel termed 'invar' together with a description of the salient features of the apparatus, and its application to the rapid and precise measurement of geodetic base lines.

In precise measuring the greatest source of error has always been the uncertainty in the temperature, and consequently of the length of the measuring unit; first because during changing temperatures the recording thermometers rarely measure the true temperature of the bar or tape, and secondly because the volumetric change in the metals generally lags behind the temperature change. The many compensating apparatus devised to obviate this source of error while theoretically perfect have been found faulty in practice and have been generally abandoned. Even such instruments as the Eimbeck Duplex apparatus and the U. S. Coast and Geodetic Survey Ice-bar apparatus have in recent years been replaced by steel tapes, which method has reached a high degree of perfection by taking great precautions for temperature changes, and making the measurements at night.

Some twenty years ago Mr. Edward Jaderin, of Stockholm, devised a most ingenious and exact method of measuring with steel and brass wires. He used wires twenty-five metres long stretched over portable tripods set in line. On the top of each tripod there was a fixed mark, and by means of a graduated scale at the forward end of his wire he measured the distance between successive tripods, the wire being kept at a constant tension with spring balances.

Several years ago M. Ch. Guillaume, Assistant Director of the International Bureau of Weights and Measures in making researches with alloys of nickel and steel discovered that an alloy of these two metals containing about thirty-six per cent of nickel possesses a very small coefficient of expansion and its use was immediately suggested for base measurement. To this alloy, which is made by a secret process, has been given the name 'invar' a word derived from the same root as the word 'invariable,' and having a similar meaning.

By the use of invar in the forming of wires, and the method of M. Jaderin somewhat modified and improved, we now have at our command a base measuring instrument capable of the same accuracy as the most refined bar apparatus, and at the same time much more convenient and economical. It has also many advantages over steel tapes in that the invar wires may be standardized at any Bureau of Standards instead of in the field, greater precision can be attained, the work may be done in daytime, and errors due to uncertain temperatures are almost entirely eliminated.

*Properties and Manufacture of Invar.*—Invar is more like nickel than steel in appearance. It is less easily oxidized, yet requires some care to keep it free from



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rust, especially in moist climates. This may be done by rubbing with a rag covered with vaseline, as the small spots of rust which sometimes appear on the surface do not adhere very closely, and may be easily removed in this manner. The alloy is very ductile, yet at the same time quite tenacious. It laminates and is made into wires very easily, but quickly wears out files and other hard tools. In the malleable state it will submit to great alterations in shape without rupture, while on the contrary, when it has been laminated or drawn into wires, it reaches a state of elasticity suitable for ordinary springs. The modulus of elasticity of invar in the form of cold-drawn and hammered wires is about 16,000 Kg.: mm<sup>2</sup>, its tensile strength being about one-half of that of steel. One of the peculiar properties of invar is that its modulus of elasticity increases with an increase of temperature which is contrary to all other known metals.

Invar intended for geodetic purposes is made by certain steel manufactories in France, the usual additions of manganese, silicate, and carbon being reduced to a minimum. Specimens of each casting are then examined, and only those which possess the requisite small coefficient of expansion are accepted. These are then made into wires, being forged at very high temperatures, and cold-drawn and hammered at low temperatures. They are reduced to an average diameter of two millimetres by means of steel wire-machines, and then made to the definite diameter of 1.65 m.m. through ruby holes, which give a smooth surface and a uniform diameter.

*Etuvage.*—Invar wires so manufactured are, however, by no means ready for use, but must be carefully studied and examined in the laboratory. It has been observed that invar in the course of time shows a gradual permanent lengthening extending over a number of years, which lengthening approaches slowly towards a limit which seems definite. The value of this limit depends on the temperature and the progress is more rapid as the temperature is higher. This permanent lengthening is considerably minimized by a peculiar treatment of the alloy, termed 'étuvage.'

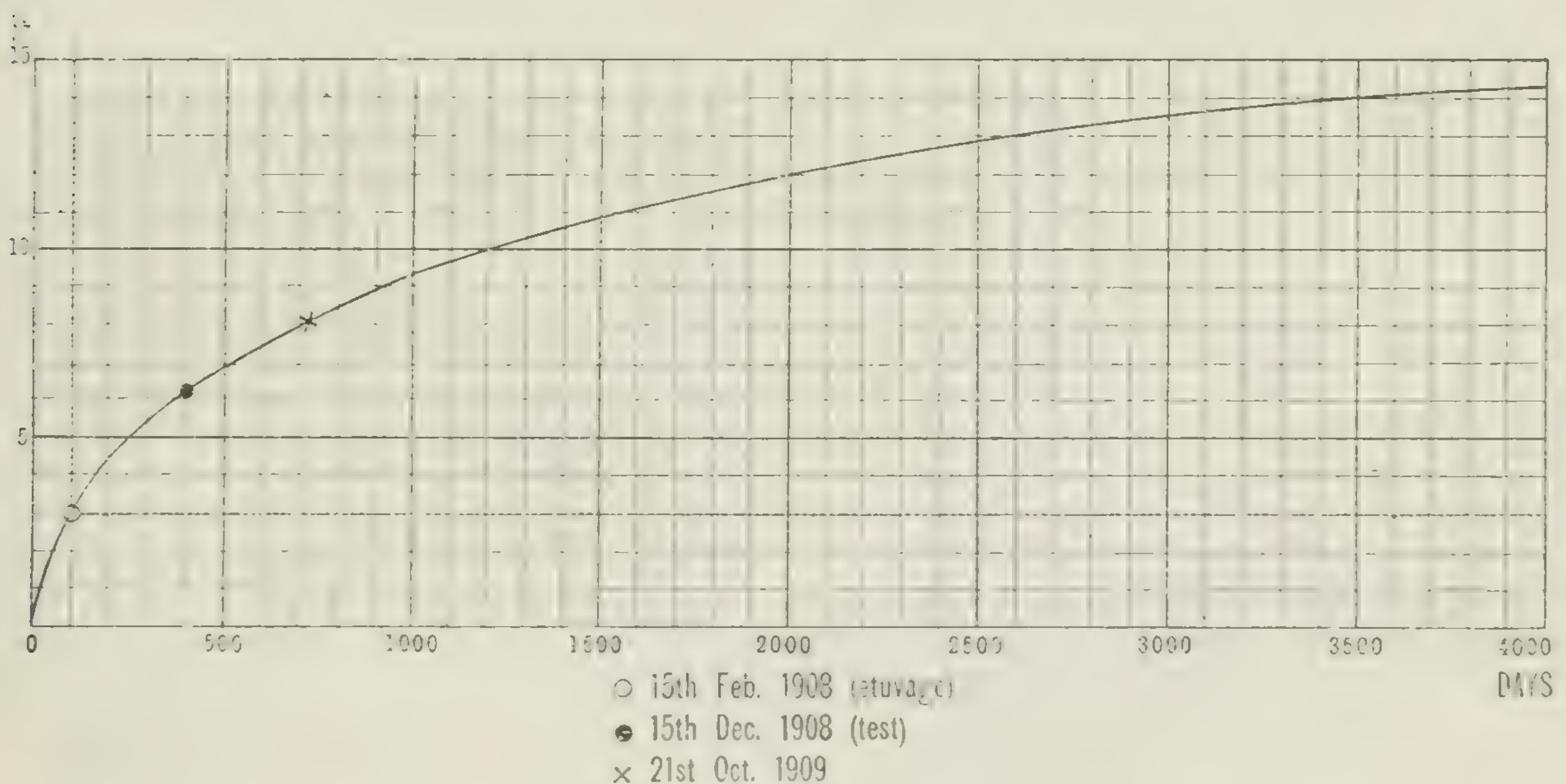


Fig. 1.

The wires are rolled on a spool-like cylindrical boiler of 50 c.m. diameter, forming a kind of drum. The boiler is filled with water, which is kept at boiling point (100° C) for several days. This temperature is then lowered gradually so as to reach 40° C or even 25° C in about three months, the alterations in temperature becoming slower as the temperature decreases. By submitting the wires to this process of 'étuvage,' they undergo the series of changes which would have taken a great number of years to accomplish at ordinary temperatures, and which changes will not now take place



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again. Even after the étuvage process is completed there is still for some time a gradual though small lengthening. This change is rather rapid at first, then becomes less and less and it is wise to keep the wires for some months before attempting to determine their absolute length.

The curve in Fig. 1 shows the gradual permanent lengthening, which takes place in the course of time, in an invar bar, one metre long, which has been treated by the étuvage operation, the temperature being reduced to 40° C, then at that of the laboratory (6° C to 22° C). The abscissae represent the number of days after étuvage and the ordinates the lengthening in microns per metre (a micron being the one-millionth part of a metre).

When the temperature of the étuvage is lowered to 25° C instead of 40° C, the origin of the curve is decreased by one hundred days and three microns, as shown by the dotted lines in the figure.

Record is kept of the dates of étuvage, and of the standardizing tests, and from the curve we can determine what alteration in length has taken place in the interim. When the wires are used for field measurements we must note the date and reckon the number of days since étuvage or test. By plotting off the correct distance along the abscissa the curve will show in microns per metre the gradual lengthening of the wire, and therefore we have the quantity which must be added to the value of the wire obtained in the standardization.

Invar wires Nos. 272 and 273, which belong to the casting, or coulée No. 1438, terminated their étuvage on February 15, 1908. Their equations of length were determined on December 15, 1908. The wires were used for measuring on October 21, 1909. Therefore by measuring off three hundred and ten days along the horizontal co-ordinate from the date of test, the curve shows an increase of 1.9 microns per metre over the length on December 15, 1908. Hence the length given in the certificate of the wires (q.v.) must be increased by 1.9 microns per metre, or 0.045 m.m. for twenty-four metres.

The corrections given by the curve ought to be considered at least for the first two years, only as an approximation to the millionth part.

*Periodic and Daily Temperature Dilatation.*—Although the expansion of invar due to temperature is very small, it is by no means negligible. When the temperature of invar is altered a change in length takes place. This change is of two kinds, termed daily and periodic, the first of which is by far the greater, and occurs simultaneously with the change in temperature. The periodic change, which is very small, follows the other slowly, and corresponds to the lag of other metals. When the new temperature is greater than the first, the periodic variation is a contraction and conversely. In order to apply this second correction for thermal variation we proceed as follows:—If we have an invar wire to be used in measuring a base line, we consider the mean temperature for the weeks which precede the measurements to be a temperature which is slowly reached, and the periodic variation will tend to approach the change corresponding to this mean temperature. The following formula of dilatation has been established by observations with the comparator:—

—6

$$\Delta l = - 0.00325 \times 10^{-6} \times l t^2.$$

$t$  being the temperature reckoned from zero.

The numerical coefficient of this formula is very small, consequently an error of five or six degrees does not affect the length of the wire one in a million.

To determine the periodic temperature dilatation of invar wires Nos. 272 and 273, which were used in the measurement of Kootenay base, the maximum and minimum temperatures of the wires were recorded each day for the fortnight preceding their use. The mean temperature for this period was 7° .4 C, and is practically the same as the mean temperature of the wires during the measurements.



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We therefore have from the above formula

$$\Delta l = 0.00325 \times 10^{-6} \times (7.4^2 - 15^2) 24^m = t \ 0.^{mm}0133.$$

This quantity may be added once for all to the value of the wires for the measurements under consideration.

*Daily Temperature Dilatation:*—The ordinary changes in the temperature recorded during the actual measurements determine the daily thermal corrections, which are applied from the regular coefficient of expansion. For wires Nos. 272 and 273 this formula for the range of ordinary temperature is

$$\Delta l = (-0.228 - 0.00040 t) 10^{-6} t l$$

and when expanded in a table for each degree from 0° C to say 30° C, gives the correction to be applied to the length of the wire for each recorded temperature.

The above formula is not the formula of absolute expansion but is the dilatation of the wires when under a tension of ten kgs. The elastic deformations decrease as the temperature increases, therefore this expansion of invar is slightly less than the free or absolute dilatation. It should be noted that this formula is negative, as the lengths of the wires decrease as the temperature rises.

*Mechanical Treatment of Wires to assure permanence in length:*—As geodetic wires must necessarily be rolled for transportation, it is important to note what effect the continual rolling and unrolling might have on the length of the wires. Numerous

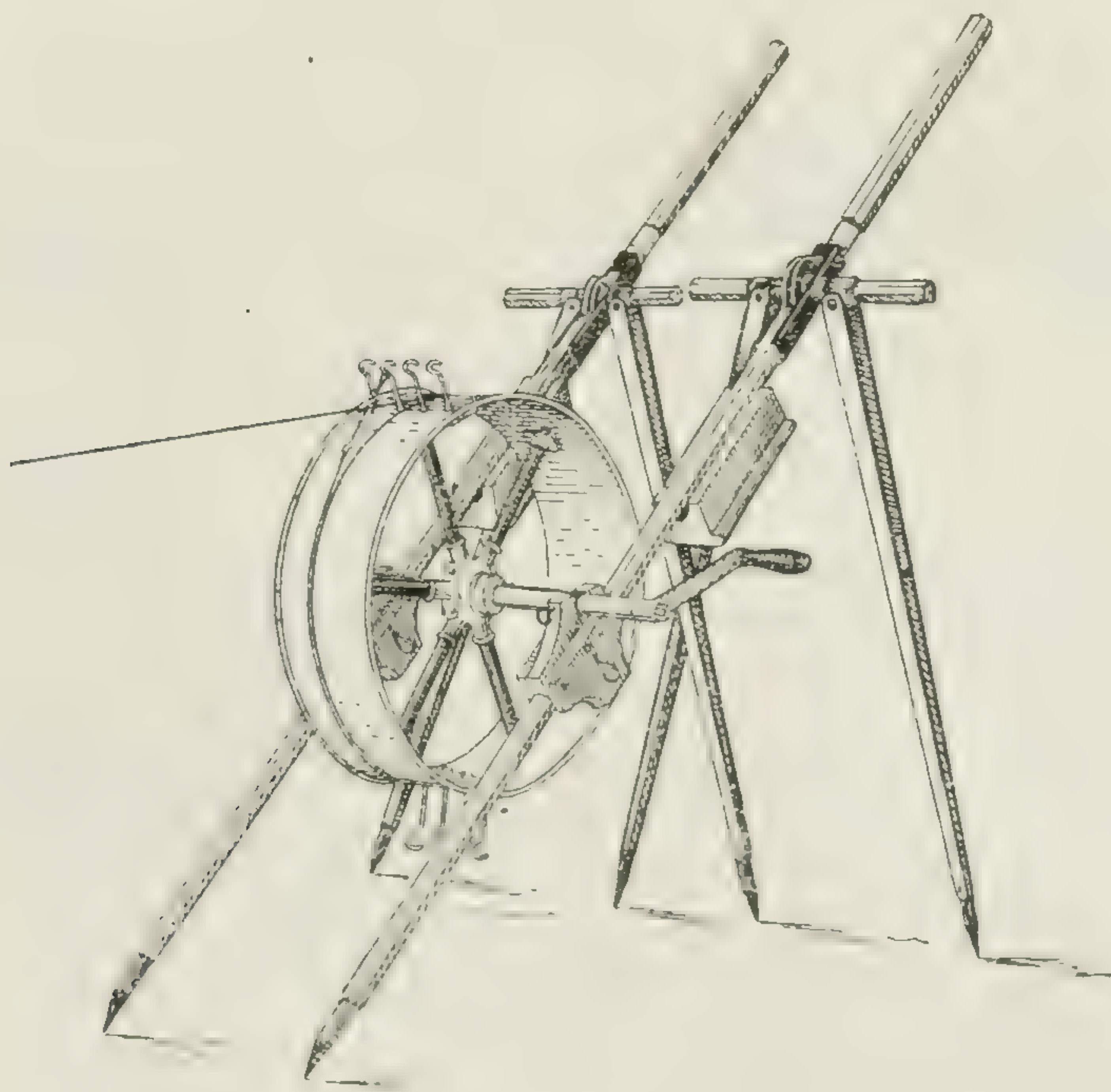


Fig. 2.

observations have shown that an invar wire, cold drawn and hammered, may be rolled in a diameter of fifty c.m. without suffering any alteration in length. Each wire before it leaves the Bureau is submitted to numerous rollings and unrollings for an extended period of time, and observations are made upon its length before and after until permanence is assured. Great care must be exercised that no portion of a wire shall be rolled in a diameter of less than fifty c.m., lest a degree of instability may be caused which will produce permanent changes of which the wire can rid itself only very slowly.



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The wires for transportation are rolled on an aluminum drum of fifty c.m. diameter as shown in figure 2. The six spokes of the drum are of steel; the outer rim is of aluminum, is about sixteen c.m. wide, and will hold four twenty-four-metre wires. The ends of the wires are fixed to two pairs of hooks fastened to the rim of the drum so that the end scales are tangential to the circumference. For winding and unwinding, the drum is fixed to a steel axle with a handle, and the whole is attached to the two tension tripods placed side by side. When not in use the drum and wires are kept in a specially designed trunk. The wires should be rolled rather loosely on the drum so as to avoid dangerous tensions due to the difference in expansion of the drum and wires. When the wires were reeled and put away after the measurement of the Kootenay base, the temperature of the air was about 3° C. Consequently the drum was heated to about 20° to avoid subsequent excessive expansion.

The wires are also treated by another mechanical process, being a system of rhythmic beating on the floor, which operation tends to produce a condition of stable equilibrium in the particles of the alloy and prevents unknown alterations in length from accidental disturbances such as might occur during long railway journeys and other rough usage.

Wires which are used under constant tension of say ten kg. are also tested by excessive tensions for long and short periods of time, and any danger of accidental lengthening from sudden shocks or prolonged forces thereby removed.

*Standardizing Tests.*—When the wires have been treated by the operations described above, and mounted at their extremities by graduated scales they are then ready for comparison to determine their absolute lengths. The graduated invar scales are of a special design which is very ingenious.

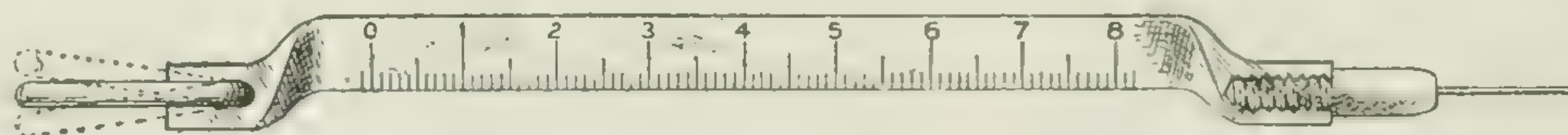


Fig. 3.

Figure 3 shows one of these scales, the graduated edge being hollowed so as to be in a direct line with the neutral axis of the wire. This form does away with errors in reading due to the terminal tangent to the curved wire not coinciding with the straight line joining the two extremities.

The standardization of the wires is made at the International Bureau, by exhaustive comparisons with the underground mural base, the wires being under conditions exactly similar to those under which they are used in field work.

The following certificate accompanied the wires received from the International Bureau of Weights and Measures by the Surveyor General of Dominion Lands.

*Bureau international des poids et mesures.*

Pavillon de Breteuil, Sèvres (S.-et-O.)

Le 15 janvier 1909.

*Certificat de deux fils en invar nos 272, 273, construits par M. J. Carpentier, à Paris, appartenant à la Direction générale du Cadastre du Gouvernement du Canada.*

*Description.*—Les fils, de 1,7mm de diamètre environ, portent, fixées aux deux extrémités, des réglottes en invar auxquelles ils sont reliés par l'intermédiaire d'un appendice goupillé dans lequel ils sont vissés et rivés.

Chacune des réglottes porte une division en millimètres, sur une longueur de 82mm. chiffrée en centimètres de 0 à 8, la chiffraison progressant dans le même sens



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à chaque extrémité. Les traits de la division aboutissent à une arête faisant suite à l'axe du fil. L'une des réglettes porte, gravée sur la face dorsale, l'inscription: J. Carpentier, Paris, et, chacune d'elles, sur la face divisée, respectivement les numéros 272 et 273.

*Etude.*—Les fils ont été soumis d'abord à une série d'opérations de nature à assurer la permanence de leur longueur. Puis ils ont été comparés, sous la tension de 10 kg. à la base murale du bureau. Il a été fait dix séries de comparaisons effectuées du 5 novembre 1908 au 4 janvier 1909.

Les comparaisons ont été ramenées à la température moyenne de 15° à l'aide de la formule de dilatation;

$$l_t = l_0(1 - 0.000000228t - 0.00000000040t^2)$$

déterminée sur un échantillon du même fil, soumis à la même tension de 10 kg.

On a trouvé pour la distance des traits homologues des réglettes, les valeurs suivantes:—

Valeur du fil à 15° sous une tension de 10 kg.

N° 272=24 m. + 1.05 mm.

N° 273=24 m. + 0.82 mm.

La détermination de la dilatation du fil a été faite par M. Ch. Ed. Guillaume, directeur-adjoint du Bureau International des Poids et Mesures; les comparaisons ont été effectuées par MM. Ch. Ed. Guillaume, L. Maudet et A. Carrade.

LE DIRECTEUR DU BUREAU.

(Signé)

RENÉ BENOIT.

The values of the wires as given by the above certificate must be modified slightly to obtain the absolute values for the measurement of the Kootenay base.

According to the certificate,

Wire No. 272=24001.05 mm.

Wire No. 273=24000.82 mm.

at the temperature 15° C, under a tension of ten kg., on December 15, 1908.

To these values must be added the small increment + 0.0456 mm. for the 'permanent elongation due to time,' as explained above. Also the quantity + 0.0133 mm. for 'periodic temperature dilatation', determined above.

Consequently we have

Wire No. 272=24001.11 mm.

Wire No. 273=24000.88 mm.

at 15° C, under a tension of ten kg., on October 21, 1909.

These are the absolute values used in the measurements of the Kootenay base.

*Principle of measuring.*—The general principle followed in measuring is to find the number of times that a standard measure of length may be laid off along the line to be determined, marking the consecutive lengths as accurately as possible. The principle adopted by the International Bureau for measuring with invar wires, is the converse method, or in other words, to lay down courses having a certain approximate length, then to measure accurately the length of these courses. This latter method is obviously the more precise.

The apparatus used is a modification of that of M. Jäderin, and consists of twenty-four metre invar wires, having graduated end scales, a series of moveable tripods, clinometer accessories for reading the slopes of successive courses, and thermometers for recording temperature, besides such auxiliary instruments as pickets, level, levelling rods, aligning telescopes, plum-bobs, &c.

*Moveable Tripods.*—Figure 4 shows a moveable tripod, the wooden frame A, having in its top a circular opening through which passes a smaller cylindrical metallic tube, B, which is capable of a lateral displacement of several centimetres and may



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be fastened tightly to the wooden head by a thumb screw, C. The upper plate, D, bears three levelling screws held to the levelling plate by three springs. The datum mark, E, is also capable of a lateral motion by three horizontal screws, and carries a small level on its plate. The top of the datum mark is composed of a hard white alloy which will not oxidize. The cross forming the datum mark is of an ingenious design, having a bevelled edge, cut at the same angle as a cross-section of the end scales, and permits the graduations to coincide with the horizontal plane of the datum mark. A

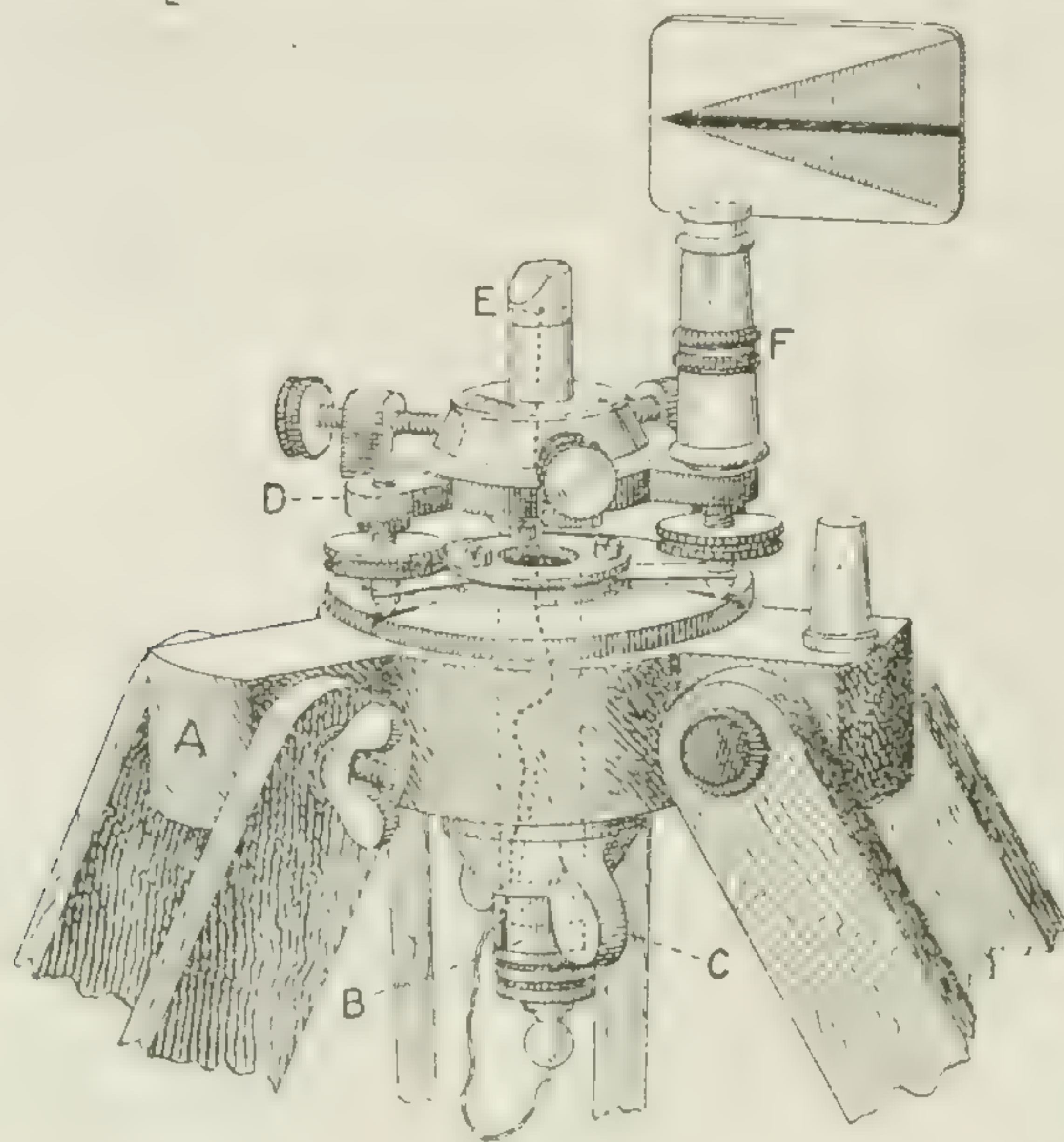


Fig. 4.

plumb-bob, when not in use, screws into the tube, B, as in the figure, and the string passes through the hollow tube to a point directly under the cross of the datum mark. By means of this plumb-bob a definite point on the ground can be quickly and accurately transferred to the moveable datum mark. In the measurements of the Kootenay, base, however, the transference was generally made by transit instrument.

The tripods, of which from six to eight are used, are set in position at approximately twenty-four metres apart, the alignment being made by small telescopes expressly intended for that purpose, or if hubs and tacks are set beforehand, the tripods can be fixed by means of the plumb-bobs.

A target, F, is placed on a vertical gudgeon beside the datum mark. On it readings of the slope are made with a small level, hereinafter described. The flag is coated with white enamel, and in the apparatus supplied by the International Bureau, the mark to be read upon was a horizontal black line six mm. wide. An improvement was made to these targets by painting a red triangle as in the figure. A better bisection can be made on the apex of the angle, and the red colour assists greatly in rapid and precise reading.

*Slope.*—The difference in slope between successive tripods is measured by means of a small level shown in figure 5. The level replaces the flag on the upright gudgeon, the centre of the telescope being at the same height as the apex of the red target. At the focus of the object glass for a distance of twenty-four metres is a photographic scale etched on glass, the graduations being so spaced that one division covers twenty-four mm. at a distance of twenty-four metres, that is, reads a slope of one-tenth of one per cent, or .001 in terms of the tangent. Readings are estimated to one-tenth of a division, or .0001. Forward and backward readings are taken at each portée, or course, thus eliminating error of collimation.

On the Kootenay base, slopes up to five per cent were read directly on the flags of the moveable tripods. Greater slopes than five per cent were measured with the assistance of a long auxiliary rod, which when reading an ascending, or positive



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grade, was hung on the forward tripod with its flag close to the ground. By means of this rod the readings of the slope were reduced three per cent, and only the aplanatic part of the lens used. In reading negative, or down grades, the auxiliary rod was placed above the low tripod, and the readings thus reduced five per cent. Wherever several slopes greater than five per cent were encountered, the heights of the end tripods above the hubs were measured with a tape, and by means of auxiliary levels with a transit the relative heights of the hubs were determined. The intermediate slopes read with the level were thus checked, and a close approximation obtained.

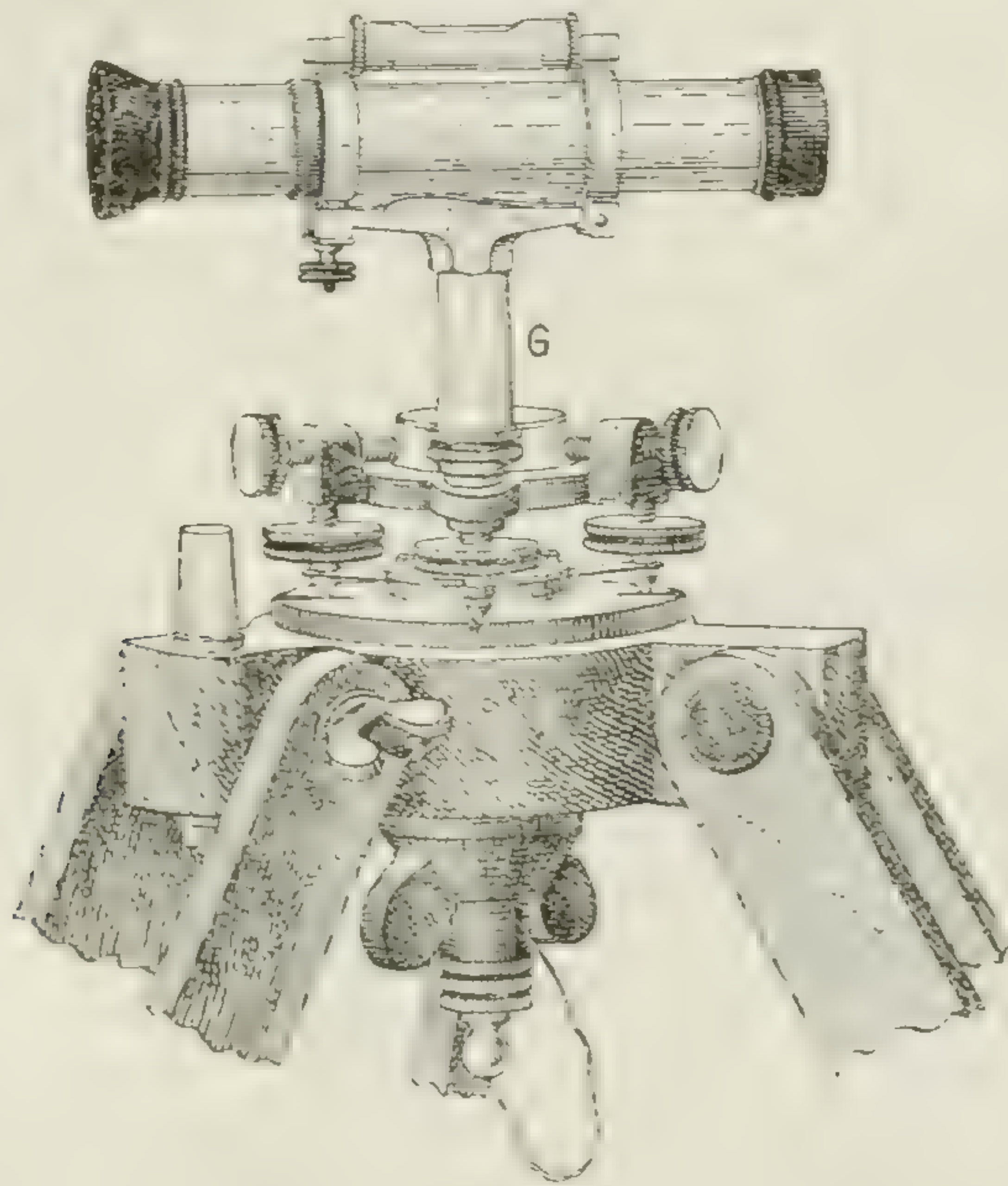


Fig. 5.

The level constants of the photographic scale were determined by sighting on a vertical rod placed at twenty-four metres. Red triangles were spaced at correct distances and the graduation errors read directly from the telescope. Numerous readings were taken under different weather conditions to allow for irregularity of light and refraction. The following corrections were obtained; they are all negative, that is, the slope read by the level is in each case to be decreased numerically by the quantities shown in the following table. The corrections for positive and negative divisions have been combined. Intermediate corrections may be determined by simple interpolation.

*Level Constants.*

Tangent.	Correction.
.005	0
.01	.00005
.015	.0001
.02	.00015
.025	.00015
.03	.0002
.035	.00025
.04	.0003
.045	.0004
.05	.00045
.055	.00052
.06	.00055
.065	.0006
.07	.00065
.075	.0007



The correction for slope is made up of two parts. One is dependent on the horizontal projection of the straight line joining the tops of the tripods; that is,  $l(1-\cos. \alpha)$ . This correction is given in table IV. in terms of tangent  $\alpha$  for a slant length of twenty-four m. The table has been elaborately constructed up to ten per cent and may be quickly applied. In the last column of the table is also given the value of  $l(1-\cos. \alpha)$  for a length of one metre. When the distance between two successive tripods differs from twenty-four m. by an appreciable amount, such as from ten to fifty mm., the correction for slope as applied directly from table IV. must itself be modified by the small correction for the said excess or deficiency.

The second correction for slope (table V.) is due to the fact that when the ends of the wire are not at the same level the curve ceases to be symmetrical, or a true catenary. The correction for this deformation in the curve is a function of the slope and although very small, cannot be neglected as it is always in the same sense, that is, positive.

Tables IV. and V. are to be found in the appendix of 'La Mesure Rapide des Bases Géodésiques,' fourth edition.

In the first chapter of the same book may be found an exhaustive mathematical discussion on the theory of measuring with a stretched wire, with the alterations which take place in the catenary when the tension is changed by even a small amount, either by friction or by changes in terrestrial gravity.

The difference between the effects of terrestrial gravity at Sèvres, France, where the wires were standardized (latitude,  $48^{\circ}$ ,  $50'$  N.; elevation, 184 feet) and at the Kootenay base (latitude  $51^{\circ}$ ,  $04'$  N.; elevation, 2,700 feet) is so small that the resulting change in tension of the ten kilogramme weight does not effect an appreciable alteration in the length of the wires.

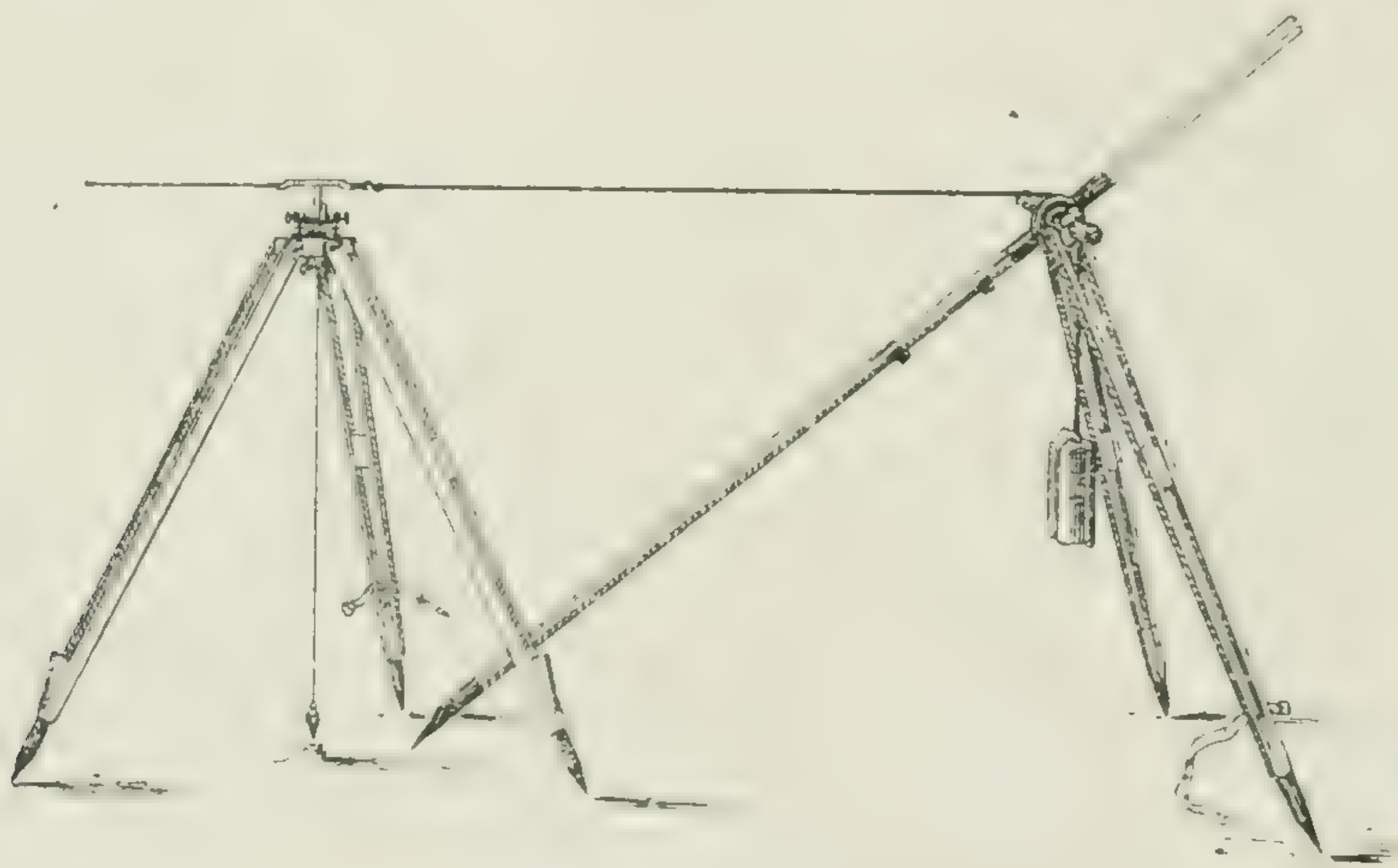


Fig. 6.

*Tension Tripods.*—The wires are stretched for measuring by submitting them to a constant tension of ten kg., which is applied by means of weights suspended and hanging freely from window-sash cord passing over ball-bearing pulleys. The pulleys are supported by tension tripods as shown in figure 6. During the measurements each tension tripod is placed in position by a man carefully drilled, and should be in the direct line of the base, and at such height that the graduated scale comes to within two or three millimetres of the datum mark. The ring at the end of the wire is attached to the tension cord by means of a hook and a snap and swivel.

*Readings on the wire.*—An observer at each end of the wire reads the position of the datum mark on the graduated scale, pressing the latter with a gentle lateral motion against the datum mark. The scales are graduated in millimetres and readings are estimated to tenths. At least five readings are made at each end for every portée. The two scales are graduated in the same direction so that the reading at



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one end is always positive, and at the other is negative. The difference between the two readings gives the excess or deficiency from the true value of the wire. The readings in a set should rarely differ by more than 0.2 mm., a discrepancy greater than 0.3 mm. denoting an error in reading. In such a case the recorder orders extra readings to be made. Every so often the wires are reversed in direction end for end, or the observers interchange their positions, in order to eliminate personal equation. the observer at the positive end then making negative readings, and *vice versa*. At each portée the readings are made on different portions of the scale, one observer alternately shoving and pulling the wire, gently, but firmly, thus eliminating tensional friction in the pulleys or other accidental sources of error.

A tabulated form is used for all records and computations at each portée, a specimen page of which is here shown.

Triangulation Base Measurement—Invar Apparatus—Records and Computations.

Recorder, Carson.  
Observers. { Rear (+), Carson.  
              { Front (—), de la Condamine.

Portée No. 278.  
Date, Nov. 2, '09.  
Time, 10.30 A.M.  
Direction, Southerly.  
Weather, Calm, Cloudy.

READINGS.							SLOPE (TANGENT).		TEMPERATURE.	
Wire No. 272.				Wire No. 273.			Forward.	Back.	° C	
									7.2	
									7.8	
No.	Rear (+)	Front (—)	R—F	Rear (+)	Front (—)	R—F	+ 0406 0406	— 0407 — 0407	Mean.....	7.5
									m.m.	
1	42.0	21.3	+ 20.7	39.6	18.7	+ 20.9	Mean	= +04065	Correction (Table III) +0.042	
2	59.0	38.4	20.6	46.4	25.6	20.8	Level Corr.	= 0003		
3	36.7	16.0	20.7	62.8	41.8	21.0		+04035		
4	50.9	30.2	20.7	46.0	25.1	20.9				
5	32.8	12.1	20.7	58.3	37.4	20.9				
									m.m.	
							Corr. Table IV	— 19.465		
								— .048		
								19.513		
								— .016		
								19.529		
							Corr. Table V	+ .005		
Mean.....				Mean.....			Total Corr. (—)		19.524	

			Wire No. 272.	Wire No. 273.
			mm.	mm.
Value of wire at 15°C.....			24001.11	24000.88
Correction to 7°.5.....			+ 0.042	— 0.042
Sum.....			24001.152	24000.922
Readings.....			+ 20.68	+ 20.90
Sum.....			24021.832	24021.822
Correction for Slope.....			— 19.524	— 19.524
Value of Portee.....			24002.308	24002.298



Balance sheets of the computations on groups of twenty portées greatly facilitate the final calculations and summations. A specimen page of one of these balance sheets is here given.

Triangulation Base Measurement—Invar Apparatus—Resume of Computations.

Value of wire No. 272 at 15° C on October 21, 1909=24001.11<sup>mm</sup>. Section V (southerly).

No. of Portee.	Temp.	CORR. FOR TEMP.		READINGS.		SLOPE.		Value of Portée.
		+	—	+		Tangent.	Correction (—)	
		mm.	mm.	mm.	mm.		mm.	mm.
224	6.0	0.051	.....	.....	26.45	+ .0276	9.125	23965.586
225	6.0	0.051	.....	.....	1.85	+ .01955	4.584	23994.727
226	6.1	0.051	.....	.....	3.84	+ .03745	16.806	23980.515
227	6.4	0.049	.....	19.35	.....	+ .04693	26.400	23994.109
228	6.4	0.049	.....	.....	10.32	+ .0385	17.755	23973.084
229	6.4	0.049	.....	.....	13.74	+ .0366	16.046	23971.373
230	6.6	0.047	.....	.....	23.68	— .0184	4.058	23973.419
231	6.6	0.047	.....	12.84	.....	— .0175	3.674	24010.323
232	6.8	0.046	.....	29.35	.....	— .0407	19.872	24010.634
233	7.0	0.045	.....	3.70	.....	— .0379	17.216	23987.639
234	7.0	0.045	.....	1.02	.....	— .04698	26.434	23975.741
235	7.3	0.044	.....	.....	11.32	— .03635	15.830	23974.004
236	7.4	0.043	.....	.....	5.92	— .03055	11.186	23984.047
237	7.5	0.043	.....	22.66	.....	+ .0082	0.807	24023.006
238	7.4	0.043	.....	.....	21.67	+ .0103	1.273	23978.210
239	7.2	0.044	.....	.....	57.80	+ .02145	5.507	23937.847
240	7.0	0.045	.....	10.82	.....	+ .02455	7.231	24004.744
241	7.4	0.043	.....	.....	23.86	+ .04275	21.877	23955.416
242	7.4	0.043	.....	.....	8.16	+ .0009	0.010	23992.983
243	7.5	0.042	.....	.....	3.64	— .0036	0.156	23997.356
Mean Temp....		.....	.....	99.74	212.25	.....	.....	.....
6.9		+0.920	.....	.....	—112.51	.....	—225.847	479684.769

The correction for the mean temperature at the bottom of column 2, multiplied by twenty (the number of portées) should be very nearly equal to the total temperature correction shown in column 3.

Twenty times the value of the wire at 15° C ± the total temperature correction ± total readings, minus the total correction for slope should be equal to the total sum of all the portées.

KOOTENAY BASE.

Kootenay base lies in townships 19, ranges 19 and 20, west of the fifth meridian, on the right or easterly side of Columbia river, British Columbia, about twenty-one miles southeasterly from the town of Golden.

By means of three secondary stations the base is projected to the main triangulation, connecting with primary stations 17, 20 and 21, the simplicity and rigidity of the projection being almost ideal.

The approximate mean longitude of the base is 116° 39' W; the mean latitude is 51° 04' N approximately; the mean elevation is 823 metres above sea-level; the mean bearing is 309° 08'.

The length of the base, reduced to sea-level, is 8565-56958 metres.



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Station A, marking the southerly end of the base, is 14.62 chains west, and 0.50 chains north of the wooden post marking the quarter section corner on the east boundary of section 16, township 24, range 19.

Station B, marking the northerly end of the base is 20.53 chains west and 12.28 chains south of the iron post and mound marking the northeast corner of section 35, township 24, range 20.

The end of the base, or geodetic point, at station A is the intersection of a pair of fine lines at right angles to each other, stamped in the head of a brass bolt six inches long and three-quarters of an inch in diameter with a flat head one and one-half inches square. This bolt is set in concrete three feet beneath the surface of the ground and is covered with loose earth. The head of the bolt also bears the letter A stamped upon it. There is no surface mark, except four iron reference bolts fifteen inches long and one inch in diameter which bear north, east, south and west respectively from the geodetic point, and are each distant three feet from it. A plot of ground one chain square has been fenced in around the end of the base and reserved for triangulation purposes.

Station B is similarly marked except that the bolt bears the letter B stamped upon its head.

The base line skirts the westerly edge of the Beaverfoot range of mountains close to the bottom lands of Columbia valley. It crosses the Government wagon road no less than ten times, and also intersects the surveyed line of the projected Kootenay Central railway at several points. The base runs mostly through uncleared land covered with second-growth poplar and birch, crossing also several cultivated fields, and through occasional patches of spruce and fir averaging eighteen inches. The line was cleared of all timber, grass and brush for a width of six feet, large stumps being

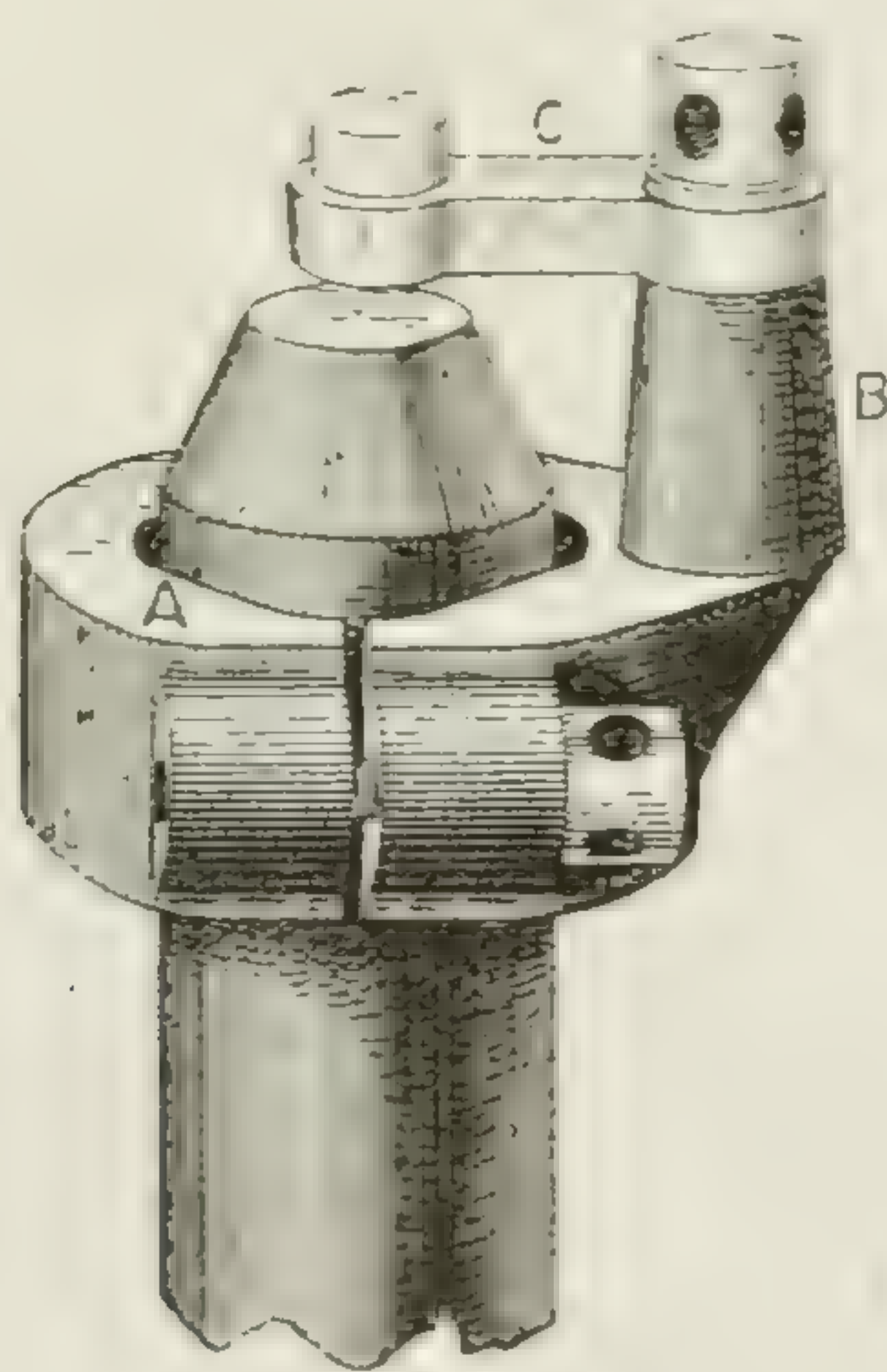


Fig. 7.

sawn off level with the ground. Beginning at the northerly end of the base, hubs twenty-four metres apart were set with a standard chain supplied by the makers of the base apparatus. This chain which is composed of twisted wire strands, was found to be unsatisfactory, as its lengths varied considerably with the temperature. The chain also soon became twisted and kinked with repeated windings and unwindings on the reel; and when the measurements were afterwards made with the invar wires the distance between some of the hubs differed from twenty-four metres by as much as fifty mm. Tacks were placed in the hubs, the alignment being made with an ordinary four-inch transit. A forward line was run, sighting being made on the signal at station A, hence the errors of alignment were very small. The hubs were set along



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the whole length of the line and the southerly end of the base as previously established was changed and set at an integral number of twenty-four-metre stretches. This change was necessary as only twenty-four-metre wires were available for measuring, although with auxiliary wires of say four and eight metres any short distance can be conveniently determined.

The base was divided into six sections by means of controlling bench marks supplied with the apparatus. A cut of one of these datum marks is shown in figure 7. It consists of a round iron peg, pointed at one end, about eighteen inches long and one and one-half inches in diameter, which may be driven firmly into the ground. The collar A, which is fastened near the top of the peg by capstan screws, has a vertical gudgeon B, which again bears a revolving horizontal arm C. The end of this arm carries a small cross which serves as the datum mark. By the double motion of the two sets of screws this cross can be set very accurately on line, and within several millimetres of the desired longitudinal distance. It is not necessary to fix the datum mark accurately for distance, as, once it is in place, the distance to and from it is measured by setting a tripod accurately over it.

By dividing the base line into sections in this manner, six closing checks on the measurements were obtained, each section being considered separately. In determining the probable error of the adopted length of the whole base the probable errors of each section line were combined. The base was divided according to the configuration of the ground, each section being about the length covered in a day's work.

The base was measured in a northerly direction with a single wire, Nos. 272 and 273 being used alternately. A complete double measurement was also made in a southerly direction using both wires. The method of using two wires is somewhat slower, but serves to check the relative lengths of the wires, mistakes in reading and other sources of error.

The weather during the measurements was exceptionally suitable for this work. The days were mostly cloudy, with rain at night. The range of temperatures on some days was only about five degrees, from 3°C to 8°C, with both rising and falling temperatures. On three days the weather was clear and the temperature rose from 3°C to 20°C, falling again to 7°C in the afternoon. Calm weather prevailed with occasional light winds, but not of sufficient freshness to disturb the wires. On two days rain fell during the measuring, but it is not thought that the sag of the wires was appreciably increased by the weight of the clinging rain-drops.

The small difference between the lengths of the base as measured by wire No. 272 and wire No. 273 simultaneously is perhaps due to a very small discrepancy between the relative lengths of the wires, combined with a probable error due to erroneous readings. The persistency of this small discrepancy always in the same sense seemed to indicate that the wires differed in length by only 0.21 mm. instead of 0.23 mm. as given by the certificate. Following this indication a cursory examination of the wires was made. A portée was set up under as favourable conditions as possible, and one hundred readings were made on each wire. While this was by no means an accurate comparison, it was very accordant with the other evidence, and the mean of the two wires has been used for the final length of the base. This discrepancy of 0.012 mm. in twenty-four metres, or four mm. in the whole base of 8.5 km. indicates a probable error of only one in two million.

The distribution of the staff of seven engaged in the measurements was as follows: one man setting tripods over the hubs, one porter carrying tripods from rear to front, one man at each of the two tension tripods, two observers, one of whom acted also as recorder and leveller, and one porter carrying an end of the wires in lieu of the observer who performed the levelling. The work would have been materially expedited had a competent man been available to take the levels, this duty falling on one of the observers whose manifold duties retarded progress. Before commencing the measuring the party was drilled with a practice wire until all became thoroughly



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familiar with the work, and acted together as a team with preconcerted signals. Before the completion of the base a speed of four hundred metres per hour was attained, when using one wire, which is indeed satisfactory, considering the nature of the ground on a base line in the Rocky mountains.

*Results of Measurements.*—The results of the measurements of the Kootenay base have been tabulated in the appended table. The mean of the double wire measurement for each section has been combined with the length obtained with a single wire, giving equal weights, although the double wire method might lay claim to a slightly greater value. The probable errors of each section due to measurements have been combined to obtain the probable error of the whole base due to measurements, each section being given a weight corresponding to the number of portées it contains. This probable error due to measurements together with the probable error of the wires give a probable error for the adopted length of the base of 4.5 mm. in 8.5 km., or one in 1,900,000.

The length of the base has been reduced to sea-level, the correction being a function of the measured length, the elevation above the sea, the latitude, and the bearing. The correction for this base is 1.1043 meters. (See tabulated statement on page 70.)

I have the honour to be, sir,

Your obedient servant,

P. A. CARSON, D.L.S.



TABULATION OF MEASUREMENTS OF KOOTENAY BASE.

Section.	Portées.	No. of Portées.	Direction of Measurement.	Date.	Temperature Range.	Mean Temperature.	Weather.	Wire Number.	Observed Measurement.	Correction to wire, mm.	Corrected Measurement.	Difference.	Mean.	mm.
				1909.	°	°			mm.	mm.	mm.	mm.	mm.	mm.
I....	1-60	60	{ N. S. }	Oct. 21..	3 to 20 to 7	12	Calm, cloudy to fair.	272	1,441,008.006	-0.720	1,441,007.286	1.396	1,441,006.588	±0.698
				Oct. 22..	7 to 14 to 5	10	Calm, cloudy.	272	1,441,006.115	Mean.	1,441,005.890			
							Occasional breezes.	273	1,441,005.666					
II....	61-109	49	{ N. S. }	Oct. 23..	3.4 to 7.5	6	Calm, cloudy, rain.	272	1,176,325.233	-0.588	1,176,324.645	1.615	1,176,323.837	±0.807
				Oct. 25..	2 to 13 to 7	9	Calm, cloudy to fair.	272	1,176,323.980	Mean.	1,176,323.030			
								273	1,176,322.080					
III....	110-181	72	{ N. S. }	Oct. 26-7	3 to 20 to 14	12	Calm cloudy, light	273	1,728,533.381	+0.864	1,728,534.245	3.464	1,728,535.977	±1.732
				Oct. 26-8	0 to 12 to 0	7.5	wind, fair.	272	1,728,538.689	Mean.	1,728,537.709			
							Calm, cloudy.	273	1,728,536.729					
IV....	182-223	42	{ N. S. }	Oct. 29..	9 to 20 to 9	13	Calm, cloudy to fair.	273	1,007,435.637	+0.504	1,007,436.141	1.744	1,007,437.013	±0.872
				Oct. 30..	6 to 11 to 3	7.4	Calm, cloudy.	272	1,007,438.340	Mean.	1,007,437.885			
							Occasional breezes.	273	1,007,437.430					
V....	224-282	59	{ N. S. }	Nov. 1..	3 to 7 to 4	6	Calm, cloudy.	272	1,414,994.519	-0.708	1,414,993.811	0.666	1,414,994.141	±0.333
				Nov. 2..	6 to 8 to 6	7	Calm, cloudy.	272	1,414,995.192	Mean.	1,414,994.477			
							Occasional showers.	273	1,414,993.762					
VI....	283-357	75	{ N. S. }	Nov. 3..	5 to 10 to 5	7	Calm, cloudy.	273	1,798,375.976	+0.900	1,798,376.876	1.106	1,798,376.323	±0.553
				Nov. 4..	5 to 15 to 2	7	Calm, cloudy to fair.	272	1,798,376.625	Mean.	1,798,375.770			
				Nov. 6..				273	1,798,374.915					

Total number of Portées - 357.

Length of Base (measured N.)..... 8,566,673.004  
Length of Base (measured S.)..... 8,566,674.761  
Mean..... 8,566,673.882

Total length.....  
8,566,673.882  
- 1,104.3 (correction to ocean level).  
8,565,569.58

Probable error due to measurement =  $\sqrt{\frac{357}{6} \left( \frac{0.698^2}{60} + \frac{0.807^2}{49} + \frac{1.732^2}{72} + \frac{0.872^2}{42} + \frac{0.333^2}{59} + \frac{0.553^2}{75} \right)}$  mm. =  $\pm 1.6$

Probable error of wires =  $\pm 4.2$  mm. (or 0.012 mm. per 24 metres).

Probable error of adopted value of Base line =  $\pm 4.5$  mm., or  $\frac{1}{1,900,000}$



## APPENDIX NO. 14.

## EXTRACTS FROM THE REPORT OF W. CHRISTIE, D.L.S.

## SURVEY OF THE FIFTEENTH BASE LINE WEST OF THE THIRD MERIDIAN.

On April 5, we left Onion Lake and travelled north by a winter road used by the settlers for hauling wood. This road followed close to the fourth meridian for a distance of about five miles, where it ended. From here we followed a chain of small lakes lying west of the meridian to a point in section 25, township 56, range 1, west of the fourth meridian. From this point we cut a road through the woods to the northeast corner of township 56, which was the starting point of my survey. We arrived there on April 6.

On the 7th I retraced the east boundary of section 36, township 56, range 1, west of the fourth meridian, and commenced the survey of the base line.

From this date the work was prosecuted as vigorously as possible until October 9, when the line was completed to the third meridian.

Having been informed by your letter of March 29, that contracts had already been given for the subdivision of townships 54, 55 and 56, ranges 23, 24, 25, 26 and 27, west of the third meridian, I did not explore the country to the south of the line in the first three ranges, as the surveyor making the subdivision will doubtless furnish a complete description of this part of the country.

A wagon road leading from Onion Lake settlement to Ministikwan lake crosses the line in section 34, township 56, range 26. This lake is situated about the north boundary of township 58, range 25.

Horsehead creek, which comes from the southeast, crosses the line in section 35, range 21, and flows north. Rabbit creek crosses the northeast corner of township 56, range 20, and flows approximately straight north across townships 57 and 58. Along the banks of both these streams are some excellent hay meadows.

The road from Battleford to Meadow lake crosses the line in section 34, township 56, range 20, running in a northeasterly and southwesterly direction. Another trail branches off this road south of Horsehead creek and runs northwest crossing the line in section 35, range 21. This latter trail goes to Makwa lake, which is reported to be about twelve miles north of the line. Along this line are some small patches of prairie.

Rabbit creek flows west across townships 56, ranges 18 and 19, and a number of small creeks tributaries of Rabbit creek, flow northwest across townships 57, ranges 18 and 19. A new road from Battleford to Meadow lake crosses the line in section 36, range 17 and Chitek river crosses in section 36, range 13. This stream is about sixty-six feet in width and has an average depth of about three feet. It flows into Meadow lake, not into Green lake as is indicated by the maps. A tributary of Chitek river, which has its source in the large swamps in townships 55, ranges 16 and 17, flows northeast, crossing the line in section 33, range 15. Along the banks of this stream are some excellent hay meadows. The south end of Green lake is in township 58, range 12, around the south end of which the country is low and swampy.

East of the Green lake road, lying in a northwesterly and southeasterly direction, is a ridge of sand hills which rise about a hundred feet above the adjacent country. These hills are covered with brule and small birch, poplar and jackpine.

A number of small lakes occur in townships 55 and 56, range 12, and Cowan lake is crossed by the line in section 34, range 8. Several large timber berths have been located in this vicinity, and they are held by the Big River Lumber company.



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Cowan lake is about thirty-five miles long by about a quarter of a mile in width. It lies in a northwesterly and southeasterly direction, the south end being in section 7, township 56, range 7. It is a shallow muddy lake and we crossed it by means of a raft, rafting horses and all across, as it was too shallow for horses to swim and too muddy to ford.

Big river empties into the south end of Cowan lake, at the mouth of which the Big River Lumber company are building a large sawmill to handle the timber held by them in the vicinity. The Canadian Northern Railway company are building a branch line to this point.

Between Cowan lake and DeLaronde lake, which the line crosses in sections 35 and 36, range 7, the surface along the line is gently rolling and is covered chiefly with old brule and small poplar, with scattered clumps of larger poplar and spruce. Around the north end of this lake are some quite extensive hay meadows.

DeLaronde lake is about thirty miles long and has an average width in the vicinity of the line of about one and one-quarter miles. It lies about due north and south and extends about two and one-half miles south of the line. Whitefish and jackfish are quite plentiful in this lake, and fishing is carried on to some extent during the winter months. This industry will no doubt be much more important in the near future, not only in DeLaronde lake but in the other large lakes to the north, with the transportation facilities afforded by the branch of the Canadian Northern railway being built to the south end of Cowan lake.

Waskesiu lake, which is about fifteen miles long and varies in width from half a mile to about four miles, lies to the north of the line in a northwesterly and southeasterly direction, in ranges 1, 2 and 3, the east end being in township 57, range 1 and the west end in township 58, range 3. A lake which is almost round and about five miles in diameter, lies north of the west end of Waskesiu lake, in townships 58 and 59, range 3.

Waskesiu river flows from Waskesiu lake to Montreal lake and Little Red river which flows into Saskatchewan river at Prince Albert has its source in the southeast corner of township 56, range 2.

The road from Prince Albert to Montreal lake passes through townships 55 and 56, range 1, running approximately straight north. It crosses the base line in section 32, township 56, range 1, and crosses township 57, range 1, in a northeasterly direction. A road branches off the main road in section 32, township 56, range 1, at what is locally known as 'the forks' and goes to Waskesiu lake. During the winter months a stopping place is kept at 'the forks.' It was abandoned at the time of the survey (October). Whitefish are plentiful in both Waskesiu lake and the lake in townships 58 and 59, and fishing is carried on to some extent during the winter.

On October 9 the line was completed to the third meridian. The surplus chainage was twelve chains and fifty-four links, and the line struck four chains and twenty-seven links north of the northeast corner of township 56, range 1, as established by the survey of the third meridian. On October 11 we started for Prince Albert, arriving there on the 15th.

As there was nothing in our records to account for the large error in longitude in closing on the third meridian, you instructed me on November 26 to re-chain the base line from the third meridian. I, therefore, organized a small party and left Prince Albert on December 21.

I began the chainage at the third meridian on December 27. As the snow was very deep the progress which we were able to make was much slower than I had anticipated. However, the work was carried on as vigorously as possible, and on February 15 the chainage was completed to the fourth meridian. No error in the original chainage was found, and the difference on the one hundred and sixty-three miles between the re-chainage and the check chainage on the original survey was one chain and sixty-eight links.



## APPENDIX No. 15.

## EXTRACTS FROM THE REPORT OF W. J. DEANS, D.L.S.

## SURVEYS IN WESTERN MANITOBA.

On June 1, I left Brandon in company with one man to carry out your instructions in reference to a correction survey required in township 24, range 30, west of the principal meridian. While at work in this township I noticed that the Canadian Northern railway were extending their Rosburn branch westerly to connect with the main line. The building of this railway will be a great benefit to the settlers who have waited long and patiently, and now that their hopes have been realized they will be encouraged to go more extensively into grain growing, for which this district is well adapted. On June 2 I completed the work in this township.

On June 9, having completed the organization of my party, I left Brandon for Glenella. Glenella is a prosperous village situated in a good agricultural district; it contains three general stores and two elevators, all of which appear to be doing a large trade. The stores are generally busy with customers, representing many European nations, seemingly happy and contented and all enthusiastic with the prospects. Few pessimists are to be found in these cosmopolitan crowds. On June 11 I left Glenella for township 20, range 12, which was originally subdivided in 1874. At the time of the original subdivision, the township was covered with a thick growth of brush and scrub, and although the lines may have been well cut out in the first survey the settlers were unable to find the lines or monuments. It was, therefore, necessary before the settlers could undertake any extensive improvements that they should know the exact position of their boundaries.

Most of the monuments to the west of Mary lake were lost; in many cases not a trace could be found of the original survey. The monuments in the easterly part of the township were mostly in existence and in a good state of preservation, except those along the east outline, which had to be reestablished. The monuments along the north boundary of the township were nearly all lost or badly obliterated.

One settler who had a homestead entry for the northwest quarter of section 28 had a newly erected house and about six acres of crop on the northeast quarter of the section. I think, in a case of this kind where a settler unintentionally makes improvements on the wrong quarter, he should be compensated by the party acquiring the improvements. This man explained to me that he had done his best to locate his land; he had even employed another Galician who had achieved quite a reputation as a surveyor, paying him three dollars a day, to locate his quarter, and now to be told he was on the wrong quarter, without any prospect of obtaining compensation for his hard labour was very discouraging. Most of the settlers in this township are Galicians, but there are a few English speaking Canadians. The Galicians have made good progress, taking into consideration the short time they have been on the land and the disadvantage of having little or no capital to start with.

Township 20, range 12, is in a recently formed drainage district. It is the intention to run drains east and west on every second sectional road allowance using the excavated material for road building. These ditches will no doubt reclaim a great deal of waste land while the roads will enable the settlers to go about at all seasons of the year. The cost of the work will be quite a tax on the settlers, but it is necessary, if the township is to keep progress with other parts. Mary lake, a large marsh with open water in places, is situated in the westerly part of the township, but will likely disappear when the drains are completed.



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Bellhampton post-office is situated in this township and has a weekly mail from Glenella. There is a new school erected lately which is well attended, the settlers apparently understanding the great importance of giving the children an education.

On July 10, I moved camp to township 20, range 13. This township was originally subdivided in 1873. The monuments were principally wooden posts; these had been destroyed in various ways. The settlers were uncertain where their boundaries were, and for that reason they were unable to fence the land and make improvements. I found very few of the marks of the original survey and as a great many new settlers were coming into the township to locate on the land, it was necessary, in order to prevent confusion and trouble, that a restoration and resurvey be made.

I found two settlers in this township on the wrong quarter sections and one on the road allowance. These men had made quite extensive improvements in the way of buildings and they felt badly when they found that it would be necessary to take the buildings down and erect them in other places.

The township is settled entirely, I think, by Galicians who appear to be making fair progress; some of them had considerable wheat and oats to sell last season for which they received a good price at Glenella. They are also raising a good many cattle and horses, so that the prospect is that in a few years they will be prosperous and well-to-do. The westerly part of the township is very low and wet and will be of little use until drained. It is expected the drainage of the township will be commenced in 1910 and completed as soon as possible. Blueberries grow in great profusion in the northerly part of the township, and are quite a source of revenue to the settlers who pick large quantities and market them at Glenella, where there is always a good demand.

On September 14, I crossed the end of the Big Grass marsh into township 18, range 10. I had instructions to examine the portions of this township which had not been retraced and report as to the necessity of making a retracement and restoration survey, and upon examination I came to the conclusion that it was not necessary to do this work. I accordingly proceeded to township 16, range 9, arriving there on September 15. I had instructions to examine this township and if considered necessary, to make a resurvey; after a brief examination I decided to go on with the resurvey.

This township having been originally subdivided in 1873, many of the marks were either lost or obliterated, and the settlers being in great doubt about the boundaries of their lands were unable to make the improvements they wished. Most of them were therefore well pleased that this work was to be done. The township is in a drainage district and some six or seven years ago large ditches were excavated along every alternate section line running east and west. The excavated material was used for a road so that travelling through this township is easy and pleasant. There are also two good trails running north, one along the Kinosota ridge and one near the east side of the township.

The construction of a branch of the Canadian Northern railway through this township has created quite a demand for the land and as the soil is generally good, and suitable for grain growing, a number of new settlers are preparing to go into that business extensively; judging by some of the crops I saw in the district, I think the venture will be a success. The Canadian Northern railway were ballasting this road and otherwise improving it last fall so now the settlers have a fairly good railway service. It is the intention of the company to extend this line, in the near future to join the main line. This extension will open up a large extent of country now without railway facilities and give a great impetus to farming operations in the district between the line and lake Manitoba.

During September and October I was also engaged in retracing the lines and restoring the monuments in township 17, range 10, an examination showing the neces-



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city of this work. There are very few settlers in this township although there is considerable land suitable for mixed farming purposes. Probably the lack of railway facilities has retarded the settlement. There are a few Icelanders in the west part of the township, along Big Grass marsh, engaged in cattle raising and dairying. This section is well adapted for that industry as there is an abundance of hay and water. I completed the survey of this township on November 4.

On the 6th I moved camp to township 16, range 8, and the same day started to retrace the lines and restore the monuments. This township is a fractional one and is known by the settlers as 'Big Point.' Nearly all the monuments in the township were either lost or obliterated. The settlers were well pleased to have the lines run and properly marked. They went to the expense of nearly three hundred dollars in grading a road which they intended to run along the east boundary of the west half of section 36. Some of the swamp land examiners set up their compass at the quarter section post on the north boundary and gave them a bearing for the line, setting up two pickets for them. This line was produced through to the south boundary of the section and as there was no quarter section post at this point, they did not know the line was erroneous and graded their road and built a new schoolhouse. I don't know the exact position of the building, but I think it will either be necessary to move it or buy a small piece of land from the owners of the four quarter sections. They wanted me to adjust this difficulty for them, but as I had no instructions to interfere in difficulties of this kind I refused.

The weather turned very cold on November 12, and I was enabled to traverse lake Manitoba across townships 16, ranges 8 and 9, thus completing my work in this part.

On November 16 I left for township 20, range 12, where I had some lines to run in the vicinity of Mary lake having been unable, on account of the water, to complete this work in the early part of the season.

On November 25 I started for township 20, range 13, to traverse Pockett lake situated in the western part of the township. I completed this work on the 26th, and sent the outfit to Glenella while I went to township 20, range 11, to report on the necessity of making a restoration and resurvey of this township. A brief examination convinced me that a survey was required, and I at once reported this fact. Many of the monuments are either lost or obliterated, and as the lands are now being settled, it seems to be the time to carry out the survey.



## APPENDIX No. 16.

## EXTRACTS FROM THE REPORT OF W. A. DUCKER, D.L.S.

## SURVEY OF PART OF THE ELEVENTH BASE LINE, WEST OF THE PRINCIPAL MERIDIAN.

On the morning of January 17, I left Winnipeg and reached Novra, the nearest station to my work, on the Prince Albert branch of the Canadian Northern railway, the same day, about 10.30 p.m. At Novra there is only a section house and there are no settlers nor roads in the district. I at once commenced cutting a road to get to my work, about seven and a half miles from Novra and some two miles less in a straight line from the railway track, and the latter portion of this road I found about the roughest country I have seen in Manitoba. The total ascent up the Porcupine hills in about four miles is nearly one thousand feet, and a number of deep ravines had to be crossed, the descent at one point being two hundred and ten feet, and at some points the sleighs had to be let down with heavy tail-rope. Most of this portion is heavily timbered with large poplar and birch and a great deal of very fine spruce up to thirty inches in diameter.

The eleventh base line across range 27 forms the south boundary of a portion of the Porcupine Forest reserve, and from the east boundary of range 28 to the second meridian runs practically through the centre of this reserve. The surface is rolling to hilly and many lakes, some of considerable size, were crossed by and seen from the base line. These lakes, and rolling hills covered with a dense growth of small jack-pine give a pleasing appearance to the landscape.

As this line crosses about the highest part of the Porcupine hills very few streams were crossed, and nearly all were dry during the past winter owing to the slight rainfall of the previous summer. In the lakes having regular outlets the water is of good quality and some small fish were seen, but I had no way of ascertaining whether they contained larger specimens, though I have little doubt they do.

Nearly all the original timber in sight of this base line has been destroyed by fire and most of the surface soil or humus is burnt off, so that the present soil is chiefly a sandy clay with a great deal of stone on the hills and ridges, and swamps with marsh and peat surface lying between.

Some belts of good poplar up to eight and ten inches in diameter were crossed but the present timber consists chiefly of a dense growth of Banksian pine, commonly known as jackpine, with some spruce, tamarack and poplar, nearly all of which is under three inches in diameter.

It seems regrettable that the Banksian pine takes so readily on recently burnt ground, largely to the exclusion of spruce and more valuable varieties as the former rarely attains much value as merchantable timber. The spruce is, however, a more persistent variety and much longer lived, and will in a time doubtless largely take the place of the other timber.

This district would be of little value for agricultural purposes or grazing, and is best suited for its present purpose as a forest reserve. If fire can be kept out of this reserve till the fallen timber rots away, it will form valuable wood supply for the surrounding country and be of untold value in conserving the rainfalls and maintaining the flow of the streams which rise in it. In its present condition with a large amount of decaying fallen timber and dense growth of young conifers, a fire starting in a dry season would be almost uncontrollable.

The evidence of moose, elk and jumping deer were very plentiful, but these animals appear to take to the lower grounds in winter and very few animals or fresh tracks were seen during my survey. Timber and prairie wolves were heard and their tracks seen, also a few lynx, but this year rabbits seem to be an unknown quantity and all other fur-bearing animals seem to be scarce in consequence. A few partridges and prairie-chickens were seen.



## APPENDIX No. 17.

## EXTRACTS FROM THE REPORT OF C. C. FAIRCHILD. D.L.S.

## SURVEY OF DOUKHOBOR VILLAGES IN THE PROVINCE OF SASKATCHEWAN.

Acting under instructions I proceeded with the survey and subdivision of fifty-four Doukhobor villages, finishing on October 15 at Kamsack and Canora.

The Doukhobors are a very peculiar people, apparently simple minded and rather unstable. My opinion of them on my first visit underwent a radical change during my second visit. On the first the Doukhobors were up for official examination before the Commissioner, while on the second visit I found them engaged at their daily pursuits and living, as I concluded, a more natural life. The communistic idea is fostered chiefly by the women and older men, and while there were distinct threats of secession in many places among the younger men individually, this disappeared if a number were present, even if each had previously individually expressed himself opposed to the idea of communism.

As to the survey itself, in some cases I found the Doukhobors indifferent, while in other cases they were very much interested, and on the whole apparently satisfied, but in a few cases quite antagonistic. We were generally kindly dealt with by them, although they attempted a few unsuccessful 'hold-ups,' in the way of charges for team hire.

I would strongly recommend that owing to the changeable and unsettled condition of the Doukhobors that none of the plans be registered until the Minister or Commission have decided which lots are to be sold, and then that only those plans of villages in which actual sales take place be registered. In many villages at the time of my visits indications led me to believe that none of the Doukhobors were likely to become qualified to own their lots for some years at least, and if they decided to leave for British Columbia or elsewhere in a body, the registration of the plans would make the final disposition of the lands unnecessarily complicated and many of the roads surveyed would be quite useless.

The services of Mr. Michael White, Inspector of Doukhobor lands, who accompanied me as interpreter, were almost invaluable. In addition to acting as interpreter, he took an elaborate census of each village and was always useful in advising me when in doubt as to the survey itself, and, in the actual field work he was ever ready with his assistance, which I was glad to, and did, avail myself of during the entire survey.



## APPENDIX No. 18.

## EXTRACTS FROM THE REPORT OF T. FAWCETT, D.T.S.

## MISCELLANEOUS RESURVEYS IN SASKATCHEWAN

Leaving Toronto on April 19, I proceeded to Winnipeg and inspected some iron posts manufactured by the Manitoba Bridge and Iron Works for the Department.

I next investigated the conditions in township 1, range 7, east of the principal meridian to ascertain if a retracement should be made. At the time of my inspection, April 24, and the week following, I found a large portion of the township covered with water, an overflow from Roseau river which at that time was unusually high. After inspection I was of the opinion that a retracement and restoration survey should be made.

In township 16, range 18, west of the principal meridian, I traversed the part of Cape lake, extending into this township from the adjoining one. The lake in question is a favourite resort with the people for some miles around, because it contains a nice sandy beach, is a good place for boating, and contains fine fish, consisting of pike, pickerel and gold-eye. Traverses of two other lakes omitted in the original survey were made in section 1, township 18, range 21, and in section 23, township 20, range 25, west of the principal meridian.

In township 19, range 21, and in township 20, range 23, west of the principal meridian, several witness monuments had been planted in such positions as to encroach on the allowance reserved for roads. These were destroyed and the monuments established either at the true corners of the sections or on the section boundaries. Other cases where the witness monuments had been planted in the road allowance were found in township 20, range 8, township 23, range 18, and township 35, range 26, all west of the second meridian. In all these cases the old monuments were destroyed and new ones established either at the true corners or at points on the section boundaries.

Reports had been sent in by settlers from several localities that duplicate monuments were found on the ground marking corners of their lands. Of the points investigated there was only one case where the duplicate monument was found, viz., on the east boundary of section 22, township 23, range 9, west of the second meridian. One of the monuments was found in the correct position and the other was four hundred and sixty-eight feet too far north: the last mentioned was obliterated and the pits at the other point renewed. There were several points where correction surveys were required, some of the errors having occurred through the men who followed to dig the pits mistaking a line picket for the section or quarter section corner. An example of this kind was observed in township 41, range 18, west of the third meridian, where I found the iron post and pits five hundred and fifty-eight feet south of the true corner. In township 25, range 28, west of the second meridian, settlers had petitioned the Department to have the road allowance across sections 20 and 21 straightened. I found the monument at the northeast corner of section 21 over one hundred and three feet south of the line joining the other section corners. In locating the source of the discrepancy, and making the corrections for which land owners petitioned, I retraced sixteen miles of line and the whole indicated careless work in the original subdivision. Besides the places above mentioned, correction surveys were



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made in township 11, range 22, township 25, range 27, and township 46, range 23, all west of the second meridian, township 13, range 12, township 34, range 3, and township 34, range 6, all west of the third meridian.

In townships 20 and 21, ranges 3 and 4, west of the second meridian, about thirty miles were retraced and results show that no part of the work done in the original survey had been done with any pretence or effort towards accuracy. In the early eighties when this work was done, the railway terminus was not farther west than Brandon, the country was considered almost without value as a field for agriculture, and the man who did the work evidently thought anything good enough for a place which he imagined would not be settled for generations. Had these great discrepancies been discovered a few years ago, before the tide of immigration set in, the effect would not have been so serious, as then the survey could have been corrected. Now that all the sections open for homesteading are occupied and the other sections that are unoccupied held by companies or individuals for sale at a high price, the effect of these bad surveys will become more serious year by year. The lines retraced in townships 20 and 21, range 8, were nearly as defective as those in ranges 3 and 4, but the land being at a greater distance from the railways, is not so valuable, and not so much in demand. Retracement surveys for the purpose of ascertaining the true bearings and lengths of erroneous lines were made in townships 20, ranges 4, 7 and 29; townships 21, ranges 4 and 7; township 22, range 6, townships 23, ranges 9 and 18; township 24, range 12; townships 25, ranges 27 and 28; township 28, range 6; township 29, range 15; townships 30, ranges 28 and 29; townships 31, ranges 17, 28 and 29; township 33, range 9; townships 34 and 35, ranges 27 and 28; and township 46, range 23, all west of the second meridian; also township 13, range 12; township 32, range 7; township 33, range 6; township 34, range 3, and township 41, range 18, all west of the third meridian.

In addition to the lakes before mentioned as traversed in Manitoba, the following in the province of Saskatchewan were also traversed; one each in township 27, range 14; township 31, range 16; township 38, range 28; townships 39, ranges 24, and 25; townships 39, ranges 25 and 26; townships 39 and 40, range 26; township 40, range 17; township 40, range 26; and two in township 40, range 25, all west of the second meridian, also one in township 34, range 6, west of the third meridian.

In townships 6 and 11, ranges 1 and 2, surveys were made for the purpose of rectifying a discrepancy existing between former surveys, and in townships 16 and 17, ranges 8 and 9, the bed of what was formerly 'Reed lake,' but which has, within a few years past, dried up, the greater portion of it being now fit for cultivation was subdivided, and the section and quarter section corners marked in the usual way with iron posts and pits. The soil being of a recent lacustrine formation is full of a marly deposit and is of a clay character, very adhesive when wet. The vegetation covering this lake bed at present is composed mostly of weeds which would disappear under cultivation. If used for meadow land I would judge the ground to be well adapted for timothy. That it would produce an immense crop of oats we had ocular demonstration as a portion of the lake bed under cultivation last year returned upwards of one hundred bushels per acre. The people who had seen the ground when covered by water up to seven and eight feet in depth were questioning and reasoning with themselves as to whether this might not occur again, and would have some hesitation about going to much expense in making improvements on the flat. As to the drainage of the lake, there is no visible cause, and it may be due to some underground channel having opened up. The condition of the surface at present is such that cultivation would be very easy, there is no sod to be broken up and the surface soil is of a loamy character and which when dry could be ploughed with the greatest of ease. The village of Morse, a station on the main line of the Canadian Pacific railway is situated on the north bank and near the middle



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of this former lake. The village contains three elevators, several stores, livery stables, blacksmith shops, agricultural agencies, school, churches, a hotel and other business places, which makes the locality a choice one.

In township 48, range 19, west of the second meridian, I retraced a portion of the east boundary and the north boundary of the Hudson's Bay Company's reserve for the purpose of ascertaining the boundaries of adjoining sections. Mr. Philip Turner, of Coxby, who was the officer in charge of the company's post at Fort-a-la-Corne when the original survey was made, and his brother who assisted him in chopping out the lines, and who has lived in the locality ever since, were both present for the purpose of pointing out the boundaries, but they found the timber had been burned and a new crop grown during the thirty-eight years which had elapsed since the lines were run, and nothing could be found in the vicinity of the north boundary to determine the position of the lines or monuments. There was a mound at the southwest corner of the reserve and I had to retrace the lines as best I could from that. In some places where we found the timber growing to a size of from eight to ten inches in diameter and brush very thick, the Indians, who were working on the lines, said they could recollect the time when this country was nearly all prairie. The fact that the wooded area is increasing was one thing I noticed in many localities, especially in the neighbourhood of Round Plain, Touchwood Hills, Newdorf and Humboldt. All through those parts of the country the timbered area is encroaching on the cultivated land instead of cultivation driving back the timber. Protection from fires which formerly passed over the country every fall will to a great extent account for this change.

Never in the history of the Northwest did I see such a rapid growth. The spring was by no means an early one, and disappointment was depicted on many countenances that climatic conditions did not admit of early seeding. However, the crops met with no set-back after once they were in the ground. Warm weather set in soon after the middle of May, followed by warm rains, and the growth was so rapid that before the end of August new wheat had been marketed as far north as Prince Albert. With the exception of a few localities where hail-storms occurred good crops prevailed over the entire province of Saskatchewan, and I can speak for the entire province as my work carried me into nearly all the settled portions of the province. I found the people everywhere enthusiastic and full of hope as they had every reason to be. The yield more than met their anticipations. Scarcity of labour was the principal drawback and the greater portion of the crop had to be threshed from shocks in the field. The country was greatly favoured by the fine weather which prevailed during the entire harvesting and threshing season. The rainy weather which continued all through the growing season had suddenly changed and the most beautiful weather prevailed all through September and the greater part of October or until a large proportion of the crop had been threshed and delivered to the elevators or shipped on the train.

A large number of the farmers united their forces to ship direct by car, and did not use the elevator, and this saved the elevator expenses, but the crop was so abundant that notwithstanding this united action on the part of the farmers the elevators had nearly if not all they could handle during the more active part of the season. Land values may be expected to make a further advance as a result of last summer's crop.



## APPENDIX No. 19.

## EXTRACT FROM THE REPORT OF L. E. FONTAINE, D.L.S.

## INSPECTION OF CONTRACTS IN EDMONTON DISTRICT.

The inspection of contract surveys involved a large mileage of travel both by wagon roads and pack trails, and those principally made use of were the wagon road leading from Edmonton to Tomahawk, the Buck Lake pack trail, the wagon road from Tomahawk to Entwistle, the Grand Trunk Pacific 'tote' road and the Jasper's and Jacques' pack trails.

The principal difficulty to be reckoned with in most cases when covering such an extent of territory is the lack of transportation facilities but in order to obviate this in a certain measure one can have his supplies freighted to depots designated in advance, during the winter months, thereby ensuring travel to and from with comparatively light loads during the course of the survey. These drawbacks I may say will gradually disappear as the country becomes more settled and new roads opened. I have noticed quite an improvement already in this respect in several sections, and more so along the route of the Grand Trunk Pacific railway where the conditions are totally different to what they were two years ago, and to-day at such places as Entwistle and Wolf Creek, two thriving little villages on the railway line, all the necessities of life can be procured in the numerous stores and good accommodation is furnished to the travelling public patronizing the stopping places.



## APPENDIX No. 20.

## EXTRACTS FROM THE REPORT OF J. FRANCIS, D.L.S.

## RESURVEYS IN MANITOBA AND EASTERN SASKATCHEWAN.

On Friday, May 28, I proceeded to Lowes lake in section 2, township 25, range 4, west of the second meridian, about five miles south of Yorkton, where I traversed a lake. As the monument for the northeast corner of section 3 was lost, this corner had to be established and the north boundary of section 2 retraced before the traverse of the lake could be properly connected with the monuments. The level of the water in the lake seems to be normal, but was lower in 1901 according to the survey of that year, it being a much drier year. Jackfish are plentiful in the lake.

Leaving here on June 3, I proceeded to section 1, township 27, range 5, west of the second meridian, where I found an error of 5.895 chains in the position of the quarter section monument on the east boundary of the section. With the consent of the owners the error was rectified and the north boundary of sections 1 and 6 were also retraced. Proceeding next to the northeast corner of section 19, township 26, range 6, west of the second meridian, I found duplicate monuments consisting of an old mound of the original survey, still unmistakable, and I. P. Pits erected later. The adjacent quarter section lines were retraced and I am convinced that the I. P. Pits have been made by mistake. Leaving this township on June 10, I proceeded to township 23, range 12, west of the second meridian, where I made a retracement survey of the township. The odd numbered sections are nearly all vacant; the even numbered ones have been homesteaded but many are now unoccupied because of climatic conditions and want of railroads.

My next work was in township 29, range 32, west of the principal meridian where I arrived on July 10. I made a retracement survey of this township. The land is nearly all taken up and fenced, fifteen to twenty per cent being cropped. The soil is first-class, and the present crop is as good as could be wished for.

The Doukhobors, who have two villages in this township, largely occupy the south half, while the remainder is taken up by English speaking people.

From this township I proceeded to townships 31 and 32, range 32, west of the principal meridian, where I found that the survey of sections 22, 27 and 34, township 31, range 32, had been extended westward into the 'Kee-see-koose' Indian reserve.

The reserve boundary was retraced through that part of townships 31 and 32 affected, also the north boundaries of fractional sections 10 and 22 in township 32, sections 22 and 34 in township 31, and the south boundary of fractional section 22 in township 31, eastward to connecting monuments. All mounds and pits within the reserve were destroyed. The road adjacent to the reserve was eliminated and added to the fractional sections. Proceeding next to township 25, range 32, west of the principal meridian, which I reached on August 10, I found the township very wet owing to a heavy downpour of rain on the day preceding our arrival. A restoration and retracement survey of this township was made. Many of the monuments had disappeared and it was only where mounds were erected that any signs could be found. Most of the even numbered sections are taken up by Galicians who have more or less land cultivated, growing wheat, oats, rye, barley and potatoes. These crops are medium, though not so good as farther north.



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Leaving this township I proceeded to section 17, township 25, range 30, west of the principal meridian to determine whether the monument at the northeast corner of section 17 was represented by a witness trench or I. P. Pits. I was unable to find either as they had both been destroyed by making a grade in the adjacent low ground. The adjacent quarter section lines were retraced and a monument erected at the northeast corner of section 17 as the ground at that corner was dry this season. Leaving here and going to township 23, range 29, west of the principal meridian an inspection was made to determine if a restoration survey was necessary. Many of the monuments are lost and obliterated and a restoration survey of the township is recommended.

My next work was in township 24, range 4, west of the second meridian, where I arrived on September 2. A retracement survey was made of a portion of the township, and that portion of the lake which had dried up was subdivided. The waters of Leech lake have risen since the survey made in 1902, as some of the monuments then erected are covered with three to five feet of water.

Leaving Leech lake on September 20, I proceeded to township 18, range 15, west of the principal meridian where I arrived on September 29. The original survey of this township was very irregular. Settlements, roads and improvements prevented a complete change of the survey of the township, so a retracement survey was made in the greater part. The township is traversed from north to south by the Canadian Northern railway. It is settled with English speaking people. Under the Manitoba Drainage Act drains are being made which will reclaim nearly all the swamp land in the west half. The village and station of Riding Mountain are situated on section 10. It is reported that boring operations are to be begun in the spring on a scale large enough to ascertain if petroleum or gas exists in paying quantities in the underlying shale in this township.

A retracement survey was also made in township 19, range 15, west of the principal meridian and of a few miles in township 29, range 17, as well as a traverse of White wood lake in this last township.



## APPENDIX No. 21.

## EXTRACTS FROM THE REPORT OF A. H. HAWKINS, D.L.S.

## BASE LINE SURVEYS IN NORTHERN ALBERTA.

We started westward on Wednesday the 14th of April and reached Athabaska river, at the mouth of Prairie creek, on the 27th, where in compliance with your instruction to have my supplies sent over the snow in winter, I had arranged to have my goods stored. I found the cache in good condition, except that a traveller hearing that it was a Government cache decided it was a good place to winter, and had established his headquarters in a shack a few miles down the Athabaska, and was drawing his supplies as required. The freighters, however, reported the matter to the Royal Northwest Mounted police, who apprehended the man, and he, being questioned, was found to be unsound in his mind, and he is at present in Brandon asylum.

From this point we turned north, but from reports I had received, I decided to remain a few days on the Athabaska, as the snow was still very deep on the divides and high lands to the north.

The trip to this point had been comparatively easy, as we were able to pass Pembina and McLeod rivers on the ice, and the muskegs were still quite solid, although usually from six inches to a foot of water lay on them. Our greatest difficulty was to procure hay for our horses, the railway contractors having attached everything in that line months ahead; after leaving Entwistle it could not be purchased until we reached 'Big Eddy,' and very often our pack train had very short rations.

We crossed the Athabaska and started north on May 4, and on May 11, we struck the fifteenth base line some three miles east of the northeast corner of section 36, township 56, range 25, west of the fifth meridian, our starting point.

From this point to the sixth meridian the country is rolling, forming the watershed between Hay and Baptiste rivers, a succession of muskegs and jackpine ridges, the surface being covered with heavy windfall and small second-growth jackpine, with an occasional clump of green timber, generally small.

The country both north and south of the line was very rolling and broken by numerous creeks and gulches, and is, in my opinion, of little value for agriculture, although generous draining would probably convert it into very fair grazing land; on the best lands, however, windfall is so heavy that the expense of clearing would be very considerable.

No signs of game were noticed after leaving Hay river except an occasional moose or deer track, and along the streams a few signs of beaver.

The soil on the jackpine ridges is a mixture of quicksand and clay and when the frost is coming out they are almost as bad to cross as the muskegs, as after two or three horses have passed over, the trail becomes a bottomless mud-hole; a new trail has to be cut out and horses are frequently snagged or otherwise injured in getting over it.

In range 26 we ran through a rather good valley for this country where we fortunately found several fair hay meadows along the creek while passing through sections 31 and 32; my ranger reported that they extended to Baptiste river, although in most places they were badly littered with windfall and some of them were very wet. Several clumps of fair spruce and jackpine were encountered in the valley but all were of small extent and at present are very difficult of access.



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From this valley to the sixth meridian, the country is rather more broken, the windfall heavier and muskegs larger, making it a rather uncomfortable country to traverse. However, on Saturday, June 12, we completed the base line to the sixth meridian. The country in the immediate vicinity of the meridian is covered with an enormous amount of dry timber, both standing and fallen, indicating somewhat better soil, but making progress very difficult.

From the meridian the country is very broken as Baptiste river is approached; it is cut up by several deep and very rugged ravines, leading to the river, but it apparently has been more frequently and more effectively burnt over, as within two miles there is but a small amount of windfall, and second-growth willow and alder with a few jackpine are to be found. In the valley proper are numerous clumps of rather fine spruce timber, ten to thirty inches in diameter, of good length and appearance, which could be easily logged by way of Baptiste river. This river is a very rapid stream, the current being from four to seven miles per hour and eight to fifty inches deep. The Indian name means 'the rushing devils,' and the rapid current and the numerous gravel bars to be found along the channel would make driving a rather difficult undertaking. The flats in the valley are largely composed of gravel in the vicinity of the base line, supporting a luxuriant growth of goose grass in many places but no meadows are to be found for six or eight miles up stream, and I believe as far or farther below. Up the river, above this last mentioned point, however, are numerous fine meadows, which sustain a luxuriant growth of bunch grass on the higher portions, and marsh grass in those portions more subject to flooding.

Along the west bank of the Baptiste at this point and from three to five miles on either side of the base line extends a very fair tract of timber consisting of jackpine, spruce and a few large balsam, six to twenty-four inches in diameter, clean and good, and extending back from the river from two to four miles. The country, however is cut by many deep and difficult ravines and is very rough and broken.

Drift coal was found in several places along the Baptiste and numerous outcrops of sandstone were noticed on the banks but no coal in place was found in this locality.

In range 2 the watershed between Little Smoky and Baptiste rivers was crossed and for several miles the country is nearly all swamp and muskeg in which many tributaries of these two rivers rise.

In section 33, township 56, range 3, the main branch of the Little Smoky is crossed, flowing through a very broken country covered with dry timber, both standing and windfall, for several miles. An old trail was followed that comes from Baptiste river and continues on down Little Smoky valley, but it had apparently been little used of late years, and was badly fallen in. Patches of very fair feed were found along this stream.

From this point to Muskeg creek, the country was rolling, jackpine ridges, muskeg and swamp. From Muskeg creek the country appears to change. It has apparently been more frequently burnt over and is consequently more open and numerous fair meadows are to be found from this stream westward.

The line passes through a beautiful jackpine grove in sections 31, range 4, and 36, range 5 extending from one-half to three-quarters of a mile on either side, timbered with small jackpine two to eight inches in diameter and no underbrush. South of the line the country is very rough but to the north extending from two to two and a half miles is a very fine valley with many good hay meadows and but little windfall. This valley extends westward along Muskeg river and in many places hay could be cut and pasturage could be procured for several hundred head of cattle or horses.

Muskeg river was crossed in section 35, township 56, range 5 and from this point we were in the foothills proper, the line running parallel to the river for several miles, but unfortunately along the sidehill through a very rough and broken country.



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To the south this rough country extends right to the mountains, while to the north of the valley were rolling broken hills, also covered with windfall; this description would include all the country through ranges 6 and 7. A small amount of timber is to be found along Muskeg river consisting of spruce and balsam from eight to twenty-four inches in diameter and of good length, and these clumps are to be found both up and down the valley as far as it was explored to the north, but for only three miles to the south. In range 8 the Grand Cache valley was crossed by the base line, the greater and best portion of it lying to the south. Here, as one of the party remarked was the beauty spot of our travels for the season. Lying in among these hills the valley extends to Sulphur and Smoky rivers to the west and thence up the Sulphur valley two or three miles. The valley itself is made up of poplar groves and patches of open prairie, supporting a luxuriant growth of grass and pea-vine and is said to be a favourite camp ground for the Grand Prairie Indians, as game is evidently abundant from the numerous signs on all sides that were noticed of bears, moose and caribou. Just on the east side of the valley two of the party encountered three grizzly bears one evening when returning to camp.

While camped on the shores of a small lake (which I have called Victor lake), in this valley, P. V. Montpetit, one of the party was drowned while bathing. The lake is small, but very deep in places and is apparently fed by springs, making it very cold. It was supposed that he took cramps and as no assistance was at hand, sank, and although a diligent search was made, which was continued for several days, no trace of the body was ever found, which melancholy circumstances were more fully reported in my progress reports.

The valley of Smoky river is very deep and rugged along this portion, but at the time of my visit the water was low and with a good raft we had but little difficulty in crossing, although the current in all these mountain streams is very rapid, being four to five miles per hour and the channel frequently broken by numerous bars. The water is cold and good to the taste, but has a milky appearance except in pools where it has the beautiful clear blue colour of the glacier from which it takes its source. There is some very fair timber along the river, chiefly spruce, eight to thirty inches in diameter, of good height and in places fairly thick. The bottom land in the valley being chiefly gravel, affords a good growth of goose grass, but meadows are exceedingly rare.

Smoky river trail to Grand Prairie now crosses just south of the base line, continues down the valley to Sheep creek and thence turns northwesterly to the Porcupine valley. The old trail started north in range 4, crossing the divide and thence down Simonette river crossing Smoky river again below the sixteenth base line, but this trail has been practically abandoned by the Indians as the Muskeg-Simonette summit and the Simonette-Smoky summit were through a country covered with dry standing timber, and very difficult to keep open. The valley of the Muskeg and Grand Cache extending from range 4 to range 8, and having a width of from one to three miles, is so exceptional as to deserve further notice in a country where such tracts are exceedingly rare. In many places hay could be cut without any preliminary clearing and with slight preparation a very large area could be brought under cultivation. Thus the open lands could be utilized to provide winter feed and most excellent pasturage is to be found in places along the hillsides which are generally partially timbered. The distance from market alone stands in the way of making these valleys a most admirable horse or cattle range, and to some extent the new Grand Trunk Pacific railway will overcome this objection. In such a locality there would be little or no danger of homesteaders encroaching on the range.

A large amount of coal was noticed in range 7. On every little stream drift could be found and, on several, seams of various widths were noticed, but along the main branch of Grande Cache creek, which crosses the base line in section 35 it was to be seen to the best advantage. This creek comes out of the mountains through a



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canyon with perpendicular cliffs rising at times to two hundred feet above the water, the formation seems to be very much broken and contorted but in many of these perpendicular cliffs could be seen seams of coal from a few inches up to eight or ten feet in width. One seam just north of the base line showed a width of about eleven feet extending up the cliff a distance of fifty or sixty feet and from this ledge the sample transmitted was taken. Then also on the creek passing through section 33, were noticed some very fine ledges. Indeed from the amount in sight in this locality, one would infer that a very large amount of coal was near at hand and should the quality warrant, mining would not be a very difficult matter as from the creek valleys the coal appears to be quite accessible. Drift coal was also noticed on the bars of Smoky river, all of which go to indicate very extensive deposits in this locality.

The scenery from Victor lake in range 8 was very fine indeed. To the south numerous snow-capped peaks are always visible on both sides of Sulphur river, and westerly the mountains come right up to Smoky river, while from the high points on the base line to the east, peak after peak, each higher than the last could be seen right ahead. The point where the line extends is partly up a very steep and rugged mountain side and although not impossible, it was deemed unwise to attempt its production farther.

The fifteenth base line was completed to the east boundary of range 9 on September 11, and on the 13th preparations were made to proceed to the sixteenth. A grave was dug and a coffin prepared in case the remains of our late comrade should be found later; the timber was cleared, a rough fence erected, and a cross planted on which was inscribed his name and date of his death. On the 14th we started for the sixteenth base, remaining one day at Muskeg cache to cut out the old Simonette trail, which leaves the Smoky trail near this point.

The Simonette trail over the ridge was badly blown in, and exceedingly difficult to find, as the numerous fires that have swept over the country have in many places destroyed every vestige of trails; however, as there is considerable green timber, jack-pine and spruce six to twenty inches in diameter, in places quite thick and good, we succeeded in locating the trail in these places and camped on the head waters of Simonette river on the 17th. The river at this point is a very small stream, three to five links wide and five inches deep, but increases in size very rapidly. On October 2 we were able to begin the production of the sixteenth base line westward. From the sixth meridian to the west fork of the Simonette the country is covered with burnt timber, both standing and windfall on the ridges and a large amount of muskeg sustaining a very scanty growth of small spruce in places and rather difficult for trail making; this condition apparently extends a very considerable distance on either side of the line.

At the intersection of the base line and meridian, huckleberries were found in greater quantities than I ever remember seeing elsewhere, the ground in the vicinity of the corner being almost black with them.

Considerable difficulty in finding horse feed was experienced in this locality. Two or three small meadows on the head waters of the east fork being all we could find; however, as the chopping was comparatively light the line was pushed rapidly ahead to the Simonette valley where feed, especially goose-grass, was more abundant.

On October 9, the first heavy snowstorm overtook us and from that time on there was more or less snow. The evidences along the valley and sidehills would indicate a very considerable annual snowfall, and this evidence is confirmed by reports from Indians met in the locality.

The timber in the valley of the Simonette is rather the best seen during the trip, many trees that would measure twenty-four to thirty inches in diameter being noticed; it is fairly thick and long and extends for twelve miles along the valley on either side of the base line, broken in places by patches of meadow and parts that have been



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burnt over; in many places it extends high up towards the summit of the valley on either side, but the valley on both sides is very rough and broken, cut by numerous small creeks having high precipitous banks.

From the Simonette to the summit between it and the Smoky the standing dry timber and windfall is very heavy indeed, and the continued snowfall made travelling over fallen timber not only exceedingly difficult but dangerous. The ascent, however, is gradual and as the summit is reached the soil seems to be of a better quality, as dry trees up to thirty-six inches in diameter were noticed on several occasions on our line, and apparently extended a considerable distance on either side. Along the summit was found a very excellent growth of grass (of course killed by the frost at the time of our visit), but as it was plentifully mixed with pea-vine it afforded very good feed for the pack train while we were in that vicinity. From the summit to Smoky river the country is exceedingly rough as the soil appears to be of considerable depth and every little stream has cut its way so deep as to make work very slow and arduous and the location and opening of a trail far from easy. The line passes through a burnt country, the timber of which is chiefly standing on account of the depth and quality of the soil and dry trees two feet in diameter were frequently in line and had to be removed. To the north, one and a half to two miles, a very fine body of green spruce timber was observed and apparently extended some distance down stream reaching from the summit to the bank of the river.

From the summit a very excellent view of the country was obtained and it was the general opinion that the mountains were from forty to fifty miles distant, but as far as the eye could reach, what appeared to be an interminable mass of dry tops met the vision, broken only in a few cases by green branches indicating living timber.

The river itself flows through what is practically a canyon, for a number of miles on either side of the line there being a rise of between three hundred and fifty and four hundred feet in ten chains, where the line crossed from bank to bank. It was very thickly covered with heavy windfall so that we had to cut out a winding trail which required to be graded in order to get the pack train down in safety. An open prairie of from thirty to forty acres on the west side of the river was very fortunately found close to the line, covered with a heavy growth of grass; otherwise our horses would have fared very poorly, as beyond a small amount of goose grass in the bottom the valley is devoid of feed.

On the west side of the river the valley ascends by a series of terraces, covered with the worst windfall that had yet been encountered, in many places rising to eight and ten feet above the surface of the ground. The soil appears to be of good quality however, and at the end of the line a fairly good growth of grass was found.

The line was produced to the east boundary of range 5 on November 13, and we then decided to close operations for the season; we started back on November 17, and arrived in Edmonton the night of December 15.

In my report of 1907-08 the suggestion was advanced that the territory along the eastern slope of the mountain from the eleventh to the thirteenth base line should be reserved as a national park and game reserve. To that suggestion I would now add that it extend to the seventeenth base line as this whole country is such that it will be many years before any great amount of it will be in demand. The large area now covered by muskegs and a much larger area covered by windfall together with the summer frosts prevalent would cause intending settlers to look askance and seek for land more easily brought under cultivation. Then, too, the game throughout this entire region is being rapidly killed off, as the wandering bands of Indians and half-breeds that are to be met with have no respect for the season of grace for any animal, and to see them is to kill if possible. It seems not only a very great pity, but a disaster that such noble animals as the moose, caribou and mountain sheep should be ruthlessly slaughtered as in a few years, if it is not prevented, they will be but names to Canadians.



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Such a reservation would also preserve in addition to those mentioned in my 1907-08 report, the following rivers:—Hay, Baptiste, Little Smoky, Muskeg and Smoky. While it is true the Smoky and Baptiste have branches originating in glaciers it is also true that these waters are largely augmented by large streams that rise in the muskegs and timbered land adjoining, which, if the timber were removed, would cause a very noticeable decrease in their volume.

This district affords an excellent place for those who delight in examining the flowers. Even at high altitudes many varieties were found of the hardier plants. During the season quite a number of the plants were examined, and of the thirty-four orders of the Dicotyledon class given in Gray's new manual thirteen representatives were found in this district.

Most of the flowers bloom late in the season and are generally seen in July and August. The fruits ripen in the latter part of August and the beginning of September. Many small fruits grow wild and in places very abundant, such as strawberries, raspberries, gooseberries, currants, huckleberries, cranberries, blueberries, June-berries, bunchberries and dewberries. These make choice food for the many bears which are to be found in the district.

The principal tree of the district is the jackpine. The country at one time was thickly covered with forests of this variety, but owing chiefly to carelessness these are now nearly burnt off and are either standing dry timber or windfall. Some of these dry pines on the rich slope measure two and a half to three feet in diameter, at four feet from the ground. A dense second growth of pine is again springing up where the fire passed over a few years ago, and if proper care was taken the country would soon be reforested. Other varieties of this district are spruce, poplar, balsam, cottonwood, tamarack and a few birch along Smoky river.

Below is given a catalogue of the various plants which were examined during the season. Nothing was done with the grasses, the mosses or the lichens, and only a few of the members of the Compositæ family were examined.

MONOCOTYLEDONS.

Order.	Family.	Genera.	Species.	Common Name and Remarks.
Orchidales. Liliales.	Orchidaceae. Liliaceae.	Calypso. Veratrum.	C. borealis. V. viride.	American white hel- lebore (poisonous).

DICOTYLEDONS.

Polygonales. Caryophyllales. Ranunculales.	Polygonaceae. Caryophyllaceae. Ranunculaceae.	Oxyria. Stellaria. Delphinium scopu- lorum. Anemone. Aquilegia. Sedum. Mitella.	digynia.  A. multifida. A. formosa. S. roseum. M. nuda.	Chickweed. Larkspur.
Rosales.	Crassulaceae. Saxifragaceae.	Ribes.  Parnassia. Saxifraga.	R. oxyacanthoides R. floridum. R. prostratum. P. palustris. S. tricuspidata.	Columbine. stone crop or orpine. mitrewort, bishop's cap. wild gooseberry. wild black currant. fetid currant.



DICOTYLEDONS—*Continued.*

Order.	Family.	Genera.	Species.	Common Name and Remarks.
Geraniales. Violales.	Rosacea.	Spiraea.	S. opulifolia.	meadow sweet.
		Amelanchier.	A. canadensis.	June-berry.
		Potentilla.	P. anserina.	silvery cinquefoil.
			P. fruticosa.	shrubby cinquefoil.
		Geum.	G. rivale.	
	Leguminosae.	Fragaria.	F. vesca.	wild strawberry.
		Dryas.	D. Drummondii.	
		Rubus.	R. Strigosus.	raspberry.
			R. Chamaemorus.	cloud berry.
		Lupinus.	L. arcticus.	wild lupine.
Mystales. Umbellales.	Geraniaceae.	Oxytropis.	O. splendens.	
		Hedysarum.	H. boreale.	
		Vicia.	V. americana.	vetch, tare.
		Lathyrus.	L. ochroleucus.	everlasting pea.
		Geranium.	G. Richardsonii.	cranesbill.
Ericales.	Violaceae.	Viola.	V. blanda.	white violet.
			V. palmata.	blue violet.
			V. canadensis.	Canada violet.
			E. angustifolium.	great willow herb.
			A. atropurpurea.	great angelica.
Gentianales. Polemonales.	Onagraceae.	Cornus.	C. canadensis.	bunchberry.
		Andromeda.	A. polifolia.	
		Arctostaphylos.	A. uva-ursi.	bearberry.
		Kalmia.	K. glauca.	pale laurel.
		Purola.	P. minor.	wintergreen.
Rubiales.	Umbelliferae.	Moneses.	M. uniflora.	one-flowered pyrola.
		Ledum.	L. latifolium.	Labrador tea.
		Rhododendron.	R. albiflorum.	
		Gaylussacia.	G. dumosa.	
		Vaccinium.	V. canadensis.	Canadian blue berry.
Campanulales.	Gentianaceae.	Gentiana.	G. acuta.	
		Polemonium.	P. Franklinii.	
		Mertensia.	M. paniculata.	lungwort.
		Pentstemon.	P. cristatus.	beard-tongue.
		Castilleja.	C. pallida.	pale-painted cup.
Campanulales.	Boraginaceae.		C. miniata.	red-painted cup.
			P. canadensis.	lousewort.
			P. lanceolata.	
		Pedicularis.	G. boreale.	northern bedstraw.
			L. involucrata.	honeysuckle.
Campanulales.	Caprifoliaceae.	Linnaea.	L. borealis.	twinfleur.
		Campanula.	C. rotundifolia.	Scotch bluebell.
		Aster.	A. radula.	
		Erigeron.	E. acris.	fleabane.
		Achillea.	A. millefolium.	yarrow.
Campanulales.	Compositae.	Arnica.	A. cordifolia.	

There were six of the exposures of coal seams found in range 7 examined, five of these were in section 2 and one in section 4. It is very difficult to make out the geology in this district, owing to the crushing and folding due to the mountain formation, and the time spent was not long enough to make it possible to determine with any degree of accuracy the position and amount of coal. The displacement and folding had been such, that within fifty yards the same rock may be seen dipping in opposite directions. All that was done therefore was to make a rough examination of the exposures and their approximate positions.

Exposure No. 1.—Beginning at the bed of the creek, and going upward were seen the following strata: First about ten feet of brown sandstone then six bands of coal and shale mixed, and from one to two feet thick, between these bands were beds of sandstone; these covered about fifteen feet and afterwards there was about sixty feet of shale and sandstone, with small layers of iron clay. On top of this was about



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thirty feet of alternate bands of coal and highly carbonized shale; the bands of coal in these thirty feet are from two to eight feet thick and above this there was about sixty feet of brown sandstone with a couple of bands about one foot thick of coal. The dip of these seams was about  $60^{\circ}$  from the horizon towards the northeast, the strike was about S  $45^{\circ}$  E.

Exposure No. 2.—The formations of all the exposures are very similar and much like that described in No. 1, but the outcrops of coal are different. Here was found a seam of coal from eight to ten feet thick; this seam was better defined than any in the preceding exposure. Part of the coal here projected out from the rocks, and it had a very good appearance. The dip was about  $45^{\circ}$  towards the northeast and the strike was about S  $20^{\circ}$  E.

Exposure No. 3.—Here was seen a seam about six feet in thickness, but was not nearly so well defined, nor of as good a quality as No. 2. The dip was  $75^{\circ}$  toward the northeast and the strike about S  $50^{\circ}$  E.

Exposure No. 4.—This was very similar to No. 3, but the seam was much wider, and twisted and crushed. There has evidently been a folding of the rocks here, as the dip was completely changed, being about  $50^{\circ}$  towards the southwest while the strike was about due north.

Exposure No. 5.—The coal of this exposure was the best found on Creek No. 1, but the seam was only four feet in thickness, and the walls were very good, the dip being about  $50^{\circ}$  toward the northeast and the strike S  $20^{\circ}$  E.

Exposure No. 6.—This was the one found on Creek No. 2 and appeared to be the most promising of any. It was about eight to ten feet thick, and the coal appeared to be of good quality. The dip here was nearly opposite that in creek No. 1, being about  $45^{\circ}$  toward the northwest and its strike was about N  $30^{\circ}$  E.

This coal is thought to belong to the Kootanie measures, and if so, it is the farthest north along the Rockies, that this variety has been found.



## APPENDIX No. 22.

## EXTRACTS FROM THE REPORT OF H. S. HOLCROFT, D.L.S.

## RESURVEYS IN CENTRAL ALBERTA.

I left Camrose by trail on June 6, and arrived at section 29, township 44, range 19, west of the fourth meridian, on the 7th, and at once proceeded to traverse the banks of Battle river, in townships 44, ranges 18 and 19, township 43, range 18, and townships 41 and 42, range 17. I also retraced several blocks of sections in various parts of the surrounding country, and traversed some small lakes.

Here the country is moderately well settled, and appears to be prosperous; there are many schools, stores and post-offices. In some places the roads are graded and the work appears to be advancing very rapidly, but there is still room for immense improvement. Lack of scientific drainage and suitable road metal is the cause of inefficient work. The summer was rather dry and the crops were excellent, only an occasional narrow strip being hailed out. There is very little ranching being done now, as hay in large quantities is difficult for one person to get, but it can be cut on the uplands in considerable quantities. The soil is generally a clay loam, overlying a clay subsoil, although in many places the top soil is black loam of a good depth. The soil in the valley of Battle river is pure hard clay, and not suitable for agriculture except in a few places; this valley is from one-half to one mile wide. The river itself is, in summer time very little over a chain wide, with a very swift current in most places, and in depth it varies from two to eight feet. It is very tortuous, in some places winding around bends of nearly a mile in length, and coming back within a few feet of itself again. The banks are covered nearly all the way with a dense jungle-like growth of willow, poplar and balm of Gilead.

Driedmeat lake, an expansion of Battle river in township 44, range 19, is a lake about half a mile wide, and contains pike in large numbers. Later in the year the lake drops considerably, and becomes filled with a dense marine growth, but the water in the river is fresh. Although the river is swift and contains a few small rapids, no water-power could be developed in any of the townships that I surveyed. More bridges over Battle river are badly needed to facilitate communication.

A good domestic quality of lignite occurs abundantly in the valley, and outcroppings can be seen for many miles. Sometimes there are three or four outcrops at different levels from the river bed to the top of the hill, and in several places there are tunnels where the farmers in the surrounding district get out all the coal they need. The longest tunnel I saw was about one hundred and fifty feet, and was timbered up. From this mine a considerable quantity of coal was freighted to Daysland and other points on the railroad. No other minerals of economic value were seen.

A considerable number of ducks and some geese, pinnated grouse and ruffed grouse were seen. There were some signs of red deer, muskrat and mink, while coyotes and gophers were plentiful, but badgers and foxes scarce.

The Canadian Northern railway is partially completed from Vegreville to Calgary and a Grand Trunk Pacific branch line is surveyed through and the location partially chosen.

Late in August I drove from Ferry Point in section 35, township 43, range 18, to township 38, range 16, to traverse a small lake in section 12. On this trip I pass-



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ed through an excellent and prosperous portion of the country, near Red Willow and Stettler. The farmers there were working all night, by moonlight, to get their crops cut.

I next investigated and corrected the markings on some posts in township 47, range 14, and then a portion of township 57, range 12. I finished the subdivision of this township on the 23rd, and on the 24th moved to section 2, township 58, range 10, and proceeded to lay out the parcels of land for the half-breed claimants in townships 57 and 58, ranges 9 and 10, according to instructions.

## ST. PAUL DE METIS HALF-BREED RESERVE.

What is known as the St. Paul de Metis half-breed reserve consisted of townships 57 and 58, ranges 9 and 10, situated about fifteen miles north of the Saskatchewan. These townships were recently thrown open for homesteading, and it was decided to mark out the several corners of the parcels of land in these townships which were allotted to the half-breed claimants. My experience while doing this work proved to me that it was necessary to lay out all the corners of the various parcels, as most of the claimants had very remote and vague ideas where the limits of their parcels were, and where the road allowances were to be left. Houses and fences were scattered indiscriminately over the land. Hitherto these people had lived more or less as a community, squatting where they pleased, and cultivating any little patch of land that was convenient. Now more settlers are coming in and taking up homesteads there, and in the adjoining townships. The settlers who settle close by are mostly French Canadians, though others are coming in.

Quite a village has sprung up at St. Paul de Metis, in sections 4, 5, 8 and 9, township 58, range 9. About four hundred acres is laid out into town lots, and about fifteen or twenty buildings were erected during October, 1909. There are about forty or fifty buildings now, including shops, stores, houses, &c. There is a tri-weekly mail, twice a week from Vegreville and once a week from Vermilion; a land agent is resident here, and is always busy. As with most new towns the people are optimistic about a railroad coming in. The first query is generally 'Where do you think the railway will go?' or 'When do you think they will start building the road?'

Townships 57 and 58, range 10, and township 58, range 9, contain a large amount of excellent farming land and there is plenty of water of fair quality in the sloughs and lakes. The water got by digging wells is usually slightly alkaline. There is lots of slough and meadow hay, and plenty of fuel in the form of poplar, willow, balm of Gilead, and a few spruce. No coal or lignite has been discovered near here yet.

On November 20 I finished the work at St. Paul de Metis, and proceeded on the old Battleford-Fort Pitt trail to Hewitt Landing in township 53, range 26, where I had instructions to do some work.



## APPENDIX No. 23.

## EXTRACTS FROM THE REPORT OF E. W. HUBBELL, D.L.S.

## RESURVEYS AND INSPECTION OF CONTRACTS IN THE PROVINCE OF SASKATCHEWAN.

We left Prince Albert on March 23 to begin inspection work in townships 51, ranges 14, 15, 16, 17 and 18, and townships 52, ranges 14 and 15, west of the second meridian and crossed the Saskatchewan river on the ice and proceeded northeasterly along the Candle lake trail for about forty miles. From there to Lost river, we passed through a country which is fairly heavily timbered with spruce, jackpine, tamarack and poplar, a fair portion being suitable for manufacturing purposes. There are numerous sloughs and muskegs with sand ridges intervening covered with jackpine. The soil is generally of a sandy nature and the surface is fairly level. The townships inspected are thickly covered with poplar, spruce, jackpine and willow. The surface is fairly level, except where there are sand ridges, and towards the Saskatchewan and Whitefox rivers.

There are no trails in this section of the country except one made by the surveyors, which enters these townships from the west, via. Prince Albert, nor are there any settlers, but doubtless there soon will be as many fine homesteads are available. Lost river, the nearest post-officé, situated on the south side of Saskatchewan river in section 32, township 49, range 15, has a weekly mail service from 'Star City,' on the Canadian Northern railway, and distant about forty-five miles. The country is well supplied with fresh water but hay swamps are scarce and game is plentiful.

My next work consisted of resurveys in southern Saskatchewan, in township 24, range 11, west of the third meridian.

We commenced the survey of township 24, range 11, on June 17, and finished on the 22nd, surveying sixty-six miles of section line and traversing several small lakes. I found the original monuments so obliterated that a resurvey was preferable and more satisfactory. The soil in this township, in general, is a clay loam, varied occasionally by gumbo and gravel. In my opinion all kinds of grain and vegetables could be successfully raised here. The surface might be classed as rolling, although in places is quite hilly and the tops of the hills are frequently covered with boulders and stones. There is no timber whatever and but a few small hay sloughs. The larger bodies of water are strongly alkaline but in occasional pot-holes a limited supply of fairly palatable water is obtainable: however, from subsequent knowledge I found that these pot-holes during the months of July and August become dry.

There are no trails or settlers in this township, and the nearest post-office is Rossduff, situated in section 24, township 24, range 10, where they have a weekly mail service, the mail being brought from Elbow, a small town on a branch line from Moosejaw on the Canadian Pacific railway, which is also the nearest express and telegraph office. My next work was the resurvey of township 23, range 11, consisting of fifty-four miles which we commenced on June 23, and finished on July 6.

The same characteristics and topographical features occur in this township as stated in my report for township 24, range 11.

We now proceeded to resurvey townships 22 and 21, range 11, west of the third meridian, commencing July 7 and finishing August 4, having surveyed one hundred and eight miles. The soil of these townships is in general a clay loam, interspersed throughout with gumbo, gravel and alkali. The nearest post-office is Lucky lake.



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situated in section 30, township 23, range 8, to which the weekly mail is brought from Elbow, distant thirty miles. The eastern part of township 21, range 11, is considerably broken by ravines and coulées which extend into the South Saskatchewan river. There is one settler on section 1, township 22, range 11. From here we proceeded to township 23, range 12, and completed the resurvey on August 21, having surveyed sixty-six miles and traversed several lakes, mostly alkaline. We now travelled to Zealandia, distant sixty-five miles by trail, where we arrived August 25. The greater portion of the country in this district is admirably adapted for settlement, and most of the homesteads are appropriated. Everywhere signs of prosperity were visible, and at that time of the year, August 24, about sixty per cent of the magnificent crops were harvested. It was a grand sight indeed to see such tangible signs of prosperity, and the unusual excellent crops speak well for the future development of this section of the country. The average yield, as far as I could ascertain, was, wheat, twenty-five bushels to the acre, oats, about sixty, and flax, eighteen, truly a remarkable yield. The only drawback is lack of good water, and in this respect it may be in order to mention that upon more than one occasion I paid for drinking water for man and horse. However, this objection will soon be overcome as many settlers are digging wells and as a rule are fairly successful in obtaining a supply of good water.

In the five townships surveyed by me there is no wood, and a very small percentage of drinking water, in fact, during the months of July and August, we had to dig wells and were frequently disappointed in the results. There are no indications of coal or minerals; all the lakes are alkaline, and but a few small springs of fresh water are in township 23, range 12. This is an ideal ranching country, and large herds of cattle and bands of horses roam in the vicinity. Unfortunately newly dug pits appear a special attraction for these animals who paw and tear them up with their horns and hoofs, so much so, that in a few days they become almost obliterated and unrecognizable as survey monuments. The largest ranch in this district is the 'Matador' comprising townships 20 and 21, ranges 12, 13 and 14, and completely fenced. There are about 30,000 head of cattle in this ranch and their shipping place is Swift Current. During the time we were at work in this vicinity, about three months, June, July and August, the heat at times was excessive, July 24, being almost unbearable. Mosquitoes and bot flies were most troublesome, especially the latter, which at times almost drove the horses wild. A limited amount of firewood is obtainable from the coulées and ravines which extend into the South Saskatchewan. Good water is very scarce, a few springs and scattered pot-holes which contain rain and surface water being the principal source. It becomes extremely limited during the dry season as the supply depends upon the rainfall. Settlers of the surrounding district draw water many miles in specially constructed tanks. During June and July we had ten rainy days in each month and but two days in August. On several occasions these rains were accompanied by severe electrical storms and on July 6, a little hail fell.

In township 23, range 12, at sixty-five chains north of the northeast corner of section 10, we saw a portion of a large petrified tree with very distinct axe marks on it. When one considers that there have been no trees in this section of the country for centuries, the discovery is at least peculiar and interesting.

On August 26, we left Zealandia, bound for Prince Albert where we arrived the following evening. From here we travelled on a good trail to Tisdale, about one hundred miles, passing through a beautiful, and fertile country, interspersed with clumps of poplar. In every direction numerous reaping machines and an occasional threshing outfit were in operation. It was quite apparent that the various grains were not as far advanced as in the southern part of Saskatchewan, doubtless due to the higher latitude and heavier soil. About fifty per cent of the crops were cut at this date, September 1, and I afterwards learned that the yield was quite up to the expectations of the farmers. The soil for the greater part of this district ad-



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joining the Canadian Northern railway is excellent, suitable for the production of all varieties of grain and vegetables; a continuous and excellent supply of fresh water abounds everywhere and the climate is delightful. We continued inspection of contract surveys in the vicinity of New Osgoode and Lost River until October 15.

While in township 50, range 14, we came across a large camp of Indians engaged in drying moose meat, their camp resembling a perfect shambles. We subsequently learned that they had killed fifteen moose in ten days. As this slaughter is done out of season, and in various locations, it does not require a very vivid imagination to predict the inevitable and final result. Surely some stringent and drastic method might be adopted by the different governments to prevent this indiscriminate slaughter of Canada's most noble game.

The only trail in these townships is one made by the surveyors. The nearest post-office is Lost River, twenty-five to thirty miles distant, where there is a weekly mail service from Tisdale, a small town on the Canadian Northern railway, distant forty miles. While at work on this contract there were several large bush fires, and on one occasion so close was the fire that we had to stop work for the day. These large fires are at times a serious menace to survey parties as the opportunities for retreat are rather limited and it sometimes happens that surveyors have had their whole outfits destroyed by fire.

Inspection work was carried on from October 16 to November 16 in the vicinity of Crooked river, when we were compelled by weather conditions to close operations for the season.

In passing through the Indian reserve at Nut lake, the spectator is astonished at the immense area of uncut magnificent hay at the north end of the lake. This reserve is very prettily situated and I was agreeably surprised to see such a number of fields of grain cultivated by the Indians, which speaks well for their progressiveness and the fertility of the soil. They were very proud of the result of their labours and expressed their intentions to increase the yield next year.

Speaking generally the weather was favourable for surveying operations, although the atmospheric conditions, at times, were averse to observing Polaris as often as desired. On April 10, there was a heavy snowstorm which covered the ground to a depth of two feet, making travel with wagons most tiresome. On May 9, some of my party crossed Saskatchewan river on the ice, and the following day the ice broke up. The snow was practically gone by May 8, and its first appearance again, of any account, was October 22. The greatest quantity of rain fell during June and July, ten days in each month. The hottest day was July 24, the thermometer registering 98° in the shade, and the coldest day, November 13, 36° below zero. Sloughs were frozen over October 15, while April and the latter part of November were exceptionally cold.

Mosquitoes and black flies were not as numerous as the previous year, but during July and August, while at work on the prairie, the horses suffered very much from the constant attack of bot flies.

Swamp fever was again quite prevalent on the prairie and three of my horses succumbed although every known precaution was taken.

We did not perceive any indications of minerals or coal during the survey. Great quantities of game, both of the feathered variety and deer abound throughout this country. Moose especially were most numerous north of Saskatchewan river, in Lost river district.

On May 15th, at 9.10 p.m., a distinct earthquake was felt, lasting about thirty seconds.

The Canadian Northern railway has completed its magnificent steel railway and traffic bridge across Saskatchewan river at Prince Albert and have graded their railway as far as Shellbrook, a new small thriving town about fifty miles from Prince Albert.



## APPENDIX No. 24.

## EXTRACTS FROM THE REPORT OF A. W. JOHNSON, D.I.S

## SURVEYS IN THE RAILWAY BELT OF BRITISH COLUMBIA.

My first work in the New Westminster district during 1909 was to pick up and perpetuate as many of the old corners as possible around the Musqueam Indian reserve and lots 2 and 3, group 2.

I have indicated in the notes that it is probable the southwest corner of the plot of land made over to the Department of Militia and Defence is incorrect, and have shown its probable true position.

In most cases I put in a piece of iron pipe and a cedar post as well, where there was no reasonable doubt as to the true position of the corners. The weather while we were here was very wet.

On February 20, we camped on loch Erroch, near Harrison Mills, for the purpose of correcting the positions of the posts on the seventh meridian. I made very careful connections with various Canadian Pacific traverse points and the seventh meridian and then put all posts on that meridian. The posts in township 24 east of the coast meridian were generally forty links to the east. I destroyed these and substituted iron posts and stone mounds on the seventh meridian itself.

I traversed loch Erroch and a proposed road leading from the present road between Harrison bay and Nicomen, and Nicomen slough, besides running lines in section 20, township 3, range 30, west of the sixth meridian.

I next moved with my assistants and two men to Yale to finish work on the old Emory townsite, I found too much snow, and so went up to Kamloops on March 10 to finish my notes.

On April 22 I began again at Emory and connected the townsite with the Dominion system. Afterwards I moved up to Yale and ran some lines connecting the townsite with the Queen mineral claim on Yale creek.

On May 13 I moved down to Mr. Hogg's ranch near Agassiz.

I defined the northeast corner of section 22, township 3, range 29, west of the sixth meridian and the north boundary of section 22 from Canadian Pacific traverse points and other data and then went across the Fraser to Rosedale.

I retraced some old lines and ran some new ones in sections 26 and 35, township 2, range 29, and in section 6, township 3, range 28, west of the sixth meridian. This land is rapidly settling up and is suffering only from the fact that 160 acres is four times as much as one family can clear in this district of big timber.

Then I surveyed timber berth No. 296, block 1. About two-thirds of this berth is on the precipitous buttresses of Mount. Cheam. In fact we often had to climb between two and three thousand feet between breakfast and the beginning of work, and the angles were tremendous, in one case more than sixty degrees, so that though I had sighted up, on looking back the plate prevented my seeing the back picket, and I had to go back again and work around in a different way.

There is good cedar and fir on the flat, averaging thirty-six inches and good fir on the hillsides averaging twenty-four inches, but most of the timber on the hill is hemlock.

The agricultural land on the flat part of the berth consisting of about 200 acres altogether, is good. The hillsides are so steep that on the remaining 440 acres agriculture is out of the question.



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I had instructions to survey timber berth No. 533 on Lillooet lake, which we began at the end of June. Where timber berths are not sections or other regular parts of the Dominion system, it strikes me that a compass survey would cover the case. To have a line that sidles up a couple of miles of precipices because it is inaccessible, is liable to bring a note from the Crown Timber agent, and while there are probably no timber berth lines that an enterprising surveyor who sets small enough store by his neck or his transit cannot define by at least two posts, somewhere on line, the same result, barring a little accuracy, could be obtained in a very much shorter time by compass.

While this work was going on I took an assistant and one man to Harrison lake to run the lines of timber berth No. 534.

We continued work in township 3, range 4, west of the seventh meridian from where I left off near Pitt meadows the year before, and ran the township line east, to the top of the ridge between the Lillooet and Stave rivers. This is heavily timbered country and very rough, particularly the first two miles east of the Lillooet. There are no trails near the line, until the top of the ridge is reached from where one runs into Whonock.

We had an unusually wet summer; the ordinary rainfall on Stave lake, I am told, is one hundred and twenty-six inches. It is probable that upon the ridge it is fifteen inches more than this in an average year. What it was this year I don't know, but we had a tremendous lot of rain. In fact, for weeks we were hardly ever dry, especially as the undergrowth is dense huckleberry, as high as a man's head.

The ground is swampy in many places and the cedars themselves seem to feel the excessive moisture, for you find over hundreds of acres of them with dead tops and the inside rotted.

I understand that there is a fire clay on this ridge. There is some fine cedar and fir on the slopes of the hill, but also a lot of cedar that will only make shingles. There is more yellow cedar than I have seen anywhere except around Chehalis lake.

The land will not be used for agriculture for many years, and at least half of sections 6, 5, 4, 3, 2 and 1 in township 4, range 4, are either too steep or too swampy for that purpose.

The rain, which was with us always, got heavier towards the end of September, and we had snow as well which made the huckleberry bushes worse than ever.

While the Lillooet survey was beginning I went up the Bedwell bay on the north arm of Burrard inlet with Mr. Harkin, Secretary to the Minister of the Interior, and a few men to make a preliminary contour sketch of parts of sections 24 and 25 in the fractional township west of township 39, west of the coast meridian. It was proposed to subdivide this into acre and half acre lots approximately, with the idea of making a summer resort. With the help of Mr. Harkin I made a sketch of a proposed subdivision, sent it to Ottawa, and then went back to the party on the Lillooet.

In the middle of October we came down here again from Whonock and began the subdivision. I posted a large part of this, making use only of the straight lines in the design. Later on it was decided that curves should be substituted and that a road should be left along the water front. Also a great deal more of the Government land was included in the part to be subdivided.

There are 'skid' roads running through this property, which it is advisable to utilize on the plan as roads, and the character of the land is decidedly hilly in places. In fact the best part of the subdivision lies on a hill that faces the head of the inlet and slopes to the salt water of Bedwell bay.

The view is unsurpassed in the neighbourhood of Vancouver. There is a lake nearly a mile long, half a mile east from the inlet, from which a good skid road on an excellent grade runs to the inlet close to Port Moody, so that this subdivision could be very easily made accessible from New Westminster by land, as it is now by water from Vancouver. The distance is about the same from both places, being ten



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or eleven miles in either case, an hour and a half by motor boat, or three-quarters of an hour by motor car when the road is improved. With my new instructions I began work again and kept it going all winter. When the rain was a regular water-spout we worked on the roads; at other times we worked the transit under a carriage umbrella.

I am opening out eight-foot roads, cutting out all logs and blasting the stumps. I am not doing any grading as that would necessitate horses and a large number of men, but the present roads will be very useful to people who live a short distance from the water front.

The work has been slow, because the lines have to be altered so often to avoid obstructions along roads that the contour sketch, from which the design was made, did not show. In spite of the hills most of the roads are on good easy grades and very few in the entire subdivision that a horse and rig could not climb. The blocks are being laid out over the whole property, but only a limited number of the more accessible ones close to the water and the skid roads are being actually subdivided and posted in detail at this time.

The others can be easily picked up on the ground and cut into lots at any time when more land is sold.



## APPENDIX No. 25.

## EXTRACTS FROM THE REPORT OF G. J. LONERGAN, D.L.S.

## MISCELLANEOUS SURVEYS AND INSPECTION OF CONTRACTS.

The first work of the season was the reposting of St. Albert settlement. This work covered an area about fifteen miles long with a width varying from two to three miles. The settlement was originally subdivided into irregularly shaped lots in order to give the squatters the land they were settled on. In the original survey wooden posts were used without mounds and the repeated fires had destroyed about nine-tenths of them.

The town of St. Albert is situated on both banks of Sturgeon river and has a population of about 500. It is nine miles from Edmonton and will soon be connected with the capital of the province by an electric railway, although at present the Canadian Northern railway passes through the town. It is generally understood that this railway company intends to make St. Albert a junction town for the two branches of the road, one going northwest to Peace river and the other northeast to McMurray, and to locate their car shops there. The headquarters of the Roman Catholic mission of the West are situated at St. Albert. They have a large seminary and college, and a school for Indian children. The only manufacturing establishments at present are a flour mill with a capacity of one hundred barrels per day, and a brick yard. Big lake, the south boundary of the west half of the settlement, is very shallow. If the bottom of the river were lowered a few feet a thousand acres of the best hay land would be available, and I beg to recommend that the attention of the provincial government be drawn to this so that a survey may be made and the costs of draining the lake ascertained.

Having completed the survey of St. Albert, I left to inspect survey contracts that had been awarded to the different surveyors in the eastern part of the province of Alberta and the western part of Saskatchewan. We left Edmonton on August 23 and going in a northeasterly direction passed through the towns of Fort Saskatchewan, Bruderheim and Andrew. All along the road the country is well settled and we travelled on graded roads most of the way. The Galicians are proving themselves worthy of Canadian citizenship. I have been through the district a number of times, and every year I can notice the improvements, a larger number of acres under cultivation, permanent and straight fences and the sod-roofed shacks being replaced by sanitary and more comfortable dwellings. The oxen are kept for breaking purposes only, to which they are more suited than horses. The farmers have good and well kept horses for the lighter work as well as for driving. Schools are seen in every direction and they are well attended. These foreigners realize the benefit of an English education and they are trying to have their children take advantage of the schools.

After crossing Saskatchewan river at Desjarlais a few miles, mostly up hill, brought us to Sacred Heart, the Sister's mission near the west boundary of the Saddle Lake Indian reserve. Here is a school for Indian children, where they are boarded, clothed and educated. Although I did not visit the school when passing I enjoyed a rare musical treat furnished by the children. It may be news for many to learn that there is printed here a newspaper in the Cree language that has a large circulation and is much appreciated by the Indians. They are anxious for their paper and read the news as eagerly as any white man. When at Saddle lake, through



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my interpreter, I learned that the Indians were under the impression that the Government was about to enfranchise them and give them the same freedom as other citizens, not in a body but according as they proved themselves worthy. It might be a good move; at least an experiment could be tried on a small reserve. To-day the Indian who makes a success of farming or any other occupation is in the eyes of the law no better than his fellow Indian. If he wishes to sell an animal or leave the reserve he must first get permission from the agent. Of course there is no doubt that the agent uses discretion and gives the entirely self-supporting Indian greater privileges than his lazy brother, nevertheless they are keenly sensitive to the fact that they must see the agent for every business deal they wish to make. It will be a long time before they can be freed, for it is surprising the number who would willingly exchange anything they possess for another article one-hundredth of its value, that takes their fancy, but as possession dims the lustre of the diamond, so with the Indian, and he soon cries for an exchange back. Were they all free from the reserve we can easily realize that their cries would go unheard and consequently their families would perish and once more the ruling law of nature would be exemplified, 'The survival of the fittest.'

Leaving Saddle lake I travelled northward to townships 63 and 64, ranges 13, 14 and 15. These townships are traversed by both Beaver and Little Beaver rivers. The land consists generally of a few inches of black loam and a white clay subsoil. It is covered with poplar and spruce from three to eight inches in diameter with a thick undergrowth. A good cut of spruce, about two miles in width, crosses township 64 in an easterly and westerly direction. This spruce is from fifteen to thirty-five inches in diameter, straight and without limbs for the first twenty feet, in short it is as fine a lot of timber as I have ever seen. Leaving here I followed the north bank of Little Beaver river to its confluence with the Beaver in range 10. We then worked easterly through ranges 10, 9, 8 and 7, in townships 62 and 61, just following the northern edge of the St. Paul de Metis settlement. Although this newly surveyed district is not yet settled it certainly is not the kind that will remain idle long. The soil is a black loam, three or four inches deep with a clay subsoil; many places are open but there are bluffs of scrub with a few patches of good building timber, making an ideal home for the poor man. The first year he can build himself a shack and stable, cut sufficient hay as well as break a few acres and have a small crop the second year.

Continuing easterly I arrived in October at Cold lake. Here the country is rolling, that is for a mile or two around the lake and I was told by a settler that vegetation was a month later within a mile of the lake shore than farther back. This is unfortunate, for the prettiest building sites in the world are around this body of water. The lake is large and teeming with fish; large fresh salmon-trout were worth only ten cents each.

From information received from the Indians and from what I saw I would judge that the land between Cold lake and lac La Biche is of the best quality. At one place ten miles west of Cold lake there is a piece of prairie twenty miles square. The land generally is three to four inches of black loam with a clay subsoil and is covered with small poplar, birch and spruce.

A ferry is badly wanted on Beaver river, and some roadwork should be done on the hills on either side. Taking the ford on the south side the horses and wagons drop down a ten-foot cut bank and plunge into a whirling stream. Land seekers are afraid to risk their teams and in some cases most of their possessions in such a place, consequently settlement of this district north of Beaver river is at a standstill, and will remain so until some improvements are made. Going south from here on the old trail and crossing Frog creek at its mouth we came to the burying ground where the victims of the Frog lake massacre during the half-breed rebellion of 1885, were buried. A word of praise is due to the Royal Northwest Mounted police who have contributed part of their salary to build a fence around this graveyard. The detachment at Onion



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lake trim up the graves and give to the visitors passing this lonely spot twenty miles from a settlement, proof that these dead and their deeds are not forgotten, for this plot is as neat and as well kept as any city cemetery.

The best part of the land between Cold Lake and Onion Lake Indian reserves is taken up by the Frog Lake Indians, although northwest of Frog lake some good sections of rolling country are to be found. In most of the unsettled country here, however, the soil is poor and there are many lakes and tamarack swamps. The clay soil is covered with small spruce, tamarack, poplar and white birch. About the same conditions of soil and vegetation extend easterly along the ridge north of Onion Lake mission until the land starts to drop towards Red Deer river. For ten miles on either side of this river is to be found ideal land to locate on, and an abundant supply of water can be had from wells not exceeding twenty feet deep. The surface of the country is slightly rolling with four to eight inches of black loam, and seventy-five per cent is open prairie, the poplar bluffs gradually running into thicker timber northward. I was in this valley only a week and met over twenty people looking for homesteads.

Leaving here I started for Edmonton whence I went northwest to townships 62 and 63, ranges 25 and 26. This country is principally swamps and gravel ridges with a little fair land in places. However, when drained it will be fair farm land.



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## APPENDIX No. 26.

## EXTRACTS FROM THE REPORT OF C. F. MILES, D.L.S.

## MISCELLANEOUS RESURVEYS AND INSPECTION OF CONTRACTS IN SOUTHERN SASKATCHEWAN.

I found township 23, range 5, west of the third meridian well settled, but the monuments were nearly obliterated. It consists of open undulating prairie, mostly second-class. Owing to its proximity to the sand hills in the east, most of the soil is light.

While encamped in this township a very disastrous prairie fire occurred, doing in many instances great damage to the property of the settlers, injuring some of their stock so that they had to be killed, also destroying houses, mostly built of sod, and hay-stacks.

We next resurveyed townships 21 and 22, range 10. There were but few iron posts remaining and they were not marked, the old tins having disappeared and pits and mounds being nearly obliterated.

Probably three-quarters of township 21 is well adapted for farming purposes, the remainder being more or less broken by spurs of the 'Snake Bite' ridge from the west, and ravines running into the creek of the same name on the east.

From here I moved my camp westerly, passing to the north of the Matadore ranch, which is all fenced in. This part of the country is rolling and hilly and better adapted for cattle raising than farming. There are a number of small ponds scattered among the hills and signs of cattle also were seen. We discovered that the cattle of the Crookshank ranch were summering here; early in the season we had seen them grazing in townships 21, ranges 10 and 11. The country to the south, as far as could be seen, appeared hilly and broken.

We then resurveyed townships 25 and 26, range 17. The soil is a very stiff clay with but very little black loam, which I am informed, after being broken up, will produce good crops. There were no settlers in these two townships. The surface is mostly rolling and undulating open prairie, the nearest wood for fuel having to be procured from the South Saskatchewan river, where it is not too plentiful either. From this camp we moved west to section 14, township 25, range 18, to a spring, the water of which was quite alkaline. From here we made a restoration survey of the township, the southeast part of which was in a low flat and the remainder on a plateau, the eastern part being chiefly rolling and the western part more level. The soil is heavy clay.

We then moved northerly and camped in township 26, range 18, and retraced that township which is rolling in the eastern part, and undulating in the western part, the soil being the same as in the others. For water we had to depend on rapidly drying sloughs. Along the western edge of the township were several settlers who had made considerable improvements.

A new railway from Saskatoon to Calgary is under construction and supplies from there can be brought with comparative ease. Zealandia and Rosetown are the two stations on the Goose Lake branch of the Canadian Northern railway nearest to these townships. Up to the present settlers have brought in their supplies from Swift Current on the Canadian Pacific railway more than double the distance, besides having to cross the South Saskatchewan at the 'Landing,' which at times is a somewhat risky undertaking. When my outfit crossed, after completing the restoration of these townships, going south to Swift Current, there had been heavy rains and the approaches to the ferry and out of the valley had been washed out; these however, have since been repaired and put in good shape.



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West of my work in ranges 17 and 18, through Tyner and south to the river there are many settlers, whereas south of the 'Landing,' for about twenty miles there were no improvements noticed; entry may have been made for the land but it was not then occupied. On our way to Swift Current, we took occasion to branch off to sections 14 and 23 in township 18, range 14 to establish the monuments on the east boundaries of these sections. We left Swift Current on July 19, taking the old tote road along the Canadian Pacific railway track; however, owing to fences in many places, we had to make a detour, arriving at Maple Creek station on the 22nd. From here by outfit started for Battle Creek post-office, while I drove on to Walsh, where I had received instructions to settle with Mr. Nesbitt for wintering Mr. T. Fawcett's outfit and to dispose of the remainder of it. From Walsh I drove south through a well-settled country to the foot of the Cypress hills, about fifteen miles, mostly along the road allowance adjacent to the fourth meridian. From here the road ascends with some pretty steep ascents to the plateau on top of the Cypress hills. These hills (as they are called, although they are more of a raised plateau) are covered with a luxuriant growth of grass. A large quantity of hay is cut here, but ranchers in this district maintain that both horses and cattle prefer the shorter grasses, which are said to be more nutritious; few cattle are found on the plateau.

I descended by trail from the plateau into the Battle Creek valley. Here I struck a ranch which at one time had been 'Old Fort Walsh.' We were now over the 'divide' and the waters ran south, ultimately into the Gulf of Mexico instead of into Hudson Bay. Our work of inspection consisted of seven contracts (comprising about 175 townships) and extending along the international boundary from range 20, west of the second meridian to range 20, west of the fourth, the most northerly township being township 8.

Leaving Battle Creek post-office we struck south to Willow Creek post-office, and then worked westerly and back again easterly.

The whole length of our journey, on trails and off trails, we observed a great similarity in the nature of the soil, mostly gravelly and stony with but small areas of good soil. It appears that a tier of say four or five townships north from the international boundary should be reserved for grazing purposes. I think it might be advisable also to include the remaining timber, thus making it a combined grazing and forest reservation. Apart from the timber in the Cypress hills, there is none left but some on Milk river, in the coulees of Pinto Horse butte and in the ravines running out from Wood mountain. There is not enough timber in any particular locality to be set apart as a forest reserve. There are dozens of loads of timber drawn daily from the above sources of supply and it will be but a very short time, before the country will be completely denuded.

On July 29 we arrived at the Royal Northwest Mounted Police post, Lodge creek, an outpost from Maple creek, passing through poor country, covered in many places with cactus.

We passed several ranches, mostly stocked with horses, as owing to heavy losses during several winters past, the cattle have been gradually disposed of. South and west of Frenchman river the only remaining company of any magnitude, still in the cattle business, is the Blum cattle company. They have about 4,000 head north of the boundary, besides being the owners of other ranches in Montana, and one or two other western states. North and east of Frenchman river the largest cattle company originally starting with about 23,000 head of cattle, have gone out of business, their losses three seasons ago, aggregating about 12,000 head. Their cattle also ranged south to the international boundary. This company was generally known by the name of their brand 'Turkey Track.' One or two members of the old company have now gone into horse ranching altogether. Besides these there are still a few thousand head of cattle belonging to smaller ranches, running east of Pakowki lake. West of this lake for thirty or forty miles, quite a number of sheep men have located, princi-



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pally along the Etzikom coulée, locally called Kipp coulée. Probably twenty miles south of this coulée, Milk river runs in a deep valley, increasing in depth and going easterly until it crosses the international boundary.

A number of settlers have located the past season northwest of Pakowki lake, the settlements extending all the way north to the Canadian Pacific railway and west to the Alberta Railway and Irrigation company's lands.

My inspection work extended about twenty-five miles west of Coutts or Sweetgrass, a small collection of houses at the intersection of the Alberta railway with the international boundary. Ranchers along here are being gradually crowded out by squatters and homesteaders. This will have the effect of still further reducing the supply of beef cattle to be exported. The settlers will cultivate their lands and by degrees have the herd law introduced, which will be the beginning of the end of horse and cattle ranching.

Most of the land north of the boundary is more or less stony, and east of Frenchman river it is more or less broken by brooks and coulées running south across the boundary. There is no cultivation between Battle creek and Frenchman river, but in the valley of the latter there are a few settlers engaged in horse and cattle raising on a limited scale. East of Frenchman river are four tiers of townships north of the international boundary where there are no settlers up to near Wood mountain. Farther east there are some small areas of good land rather hilly and broken by Poplar river and its tributaries.

I travelled east as far as range 27 west of the second meridian. From here I moved north to Willowbunch, passing a prosperous sheep ranch on township 2, range 29. South of the Willowbunch in township 3, range 28, we passed through an apparently prosperous French settlement; a number of cattle were observed grazing around and a good number of hay stacks were also in sight from the trail. From Willowbunch we returned to Wood mountain and thence to townships 4, ranges 6 and 7.

On November 6 we started on our journey for Milestone on the 'Soo' branch of the Canadian Pacific railway passing again through Wood mountain and Elm Springs. Travelling northeasterly we passed a number of settlers, more particularly northerly from Willowbunch lake, and to judge by the number of grain stacks around their homesteads, they have had good crops in this vicinity. After traversing a range of hills and stopping to make a correction in township 11, range 25, on November 10, we reached a branch of Moosejaw creek, about six miles west of Milestone. From here the country is well settled to Milestone. Large fields are seen all along, flax apparently predominating. Much flax is sown about here on breaking, the seed fetching a good price on the market, bringing at that time \$1.40 per bushel. Milestone is a flourishing little town, there being four or five grain elevators, which appear to be busy night and day. My camp was on Moosejaw creek on section 11, township 12, range 20, and from here we moved to township 15, range 20, about fourteen miles south of Regina, through a well settled country. We next moved westerly, by way of Moosejaw to Caron, on the main line of the Canadian Pacific railway, arriving in township 19, range 29, on November 19. It was getting very wintry, the mercury going down to  $13^{\circ}$  below zero on the following morning. We were travelling on wheels, although there was good sleighing, and it was surprising to see the quantities of grain still out in the field partly in stacks and a great deal still in the stook.

From the last camp we drove to Brownlee on the Outlook branch of the Canadian Pacific railway, retracing a few miles in township 21, range 29, thence to Girvin on the Canadian Northern railway. Adjoining Girvin, we did some work in township 25, range 28, on November 27, which concluded our work in this district.

Our last work was a survey of a timber berth in township 17, range 12, east of the principal meridian. We finished running the lines and making the traverses of the timber berth on December 28.



## APPENDIX No. 27.

## EXTRACTS FROM THE REPORT OF J. B. McFARLANE, D.L.S.

## SURVEYS IN THE VICINITY OF YELLOWHEAD PASS.

On reaching Lake St. Ann we were compelled to change from sleighs to wagons. Our progress with wagons was impeded by the roads which had been opened for wagons only in places. On April 3 we reached Medicine Lodge flats, and my freighters returned from here as no wagon road was opened farther and no horse feed was procurable. The following Monday I cached part of my outfit and loading a pack train heavily with the necessities for a week's camp crossed the divide and camped on the Athabaska near the north boundary of section 32, township 51, range 24, west of the fifth meridian, late Tuesday evening. The next day I located the Grand Trunk Pacific line and the sections it would cross. On April 8 I began the season's work by running the east boundary of section 33. This line intersects the location line of the Grand Trunk Pacific railway about eighteen chains south of the township boundary.

My work for the season was to survey the sections intersected by the location line of the Grand Trunk Pacific railway between the north boundary of township 51, range 24, west of the fifth meridian and Yellowhead pass in township 45, range 4, west of the sixth meridian. The railway line crosses the northwest corner of township 51, range 24, in a southwesterly direction, following the plateau east of the Athabaska. In township 51, range 25, it approaches the river, which it follows more or less closely, to the valley of Miette river. Thence it turns to the right and follows Miette river closely to Yellowhead pass. The Yellowhead pass pack trail, or the old Jasper pack trail, follows the railway closely; generally a branch of the trail is on either side of the Athabaska. A branch trail cut by railway surveyors along Brulé lake was also convenient for us, so that we had no trails to cut all season.

The Athabaska valley through townships 51, ranges 24, 25 and 26, is partly wooded with small jackpine and partly open brule with scattered poplar and willow. Spruce large enough for timber occurred only in a few small patches. The soil is chiefly sand and gravel, the loam on top averaging about two inches except in the muskegs or small flats where it has accumulated from the surrounding hills. In township 50, the western part of range 26 and the eastern part of range 27 are thickly covered with spruce averaging about ten inches in diameter, as is also the northeast corner of township 49, range 27, which lies east of Brulé lake. This timber is all included in timber berth No. 1099, and is almost wholly in Jasper Forest Park reserve, the northeast boundary of which passes close to the northeast corner of section 32, township 50, range 26, in a southeasterly direction. The southwest corner of township 49, range 27, is flooded to a large extent by the Athabaska, there being many ponds and channels at low water but at high water in many places the water is six feet deep among ten-inch spruce and thick willow. Several lines we contemplated running here had to be abandoned as there was no possible way of cutting them out. However the railway followed closely along lines run the previous year so that the object of the survey was not interfered with. Bullrush mountains on the west of Brulé lake and Folding mountain in the southeast encroach largely on this township and comprise the outside range of the Rockies. Above this the Athabaska valley is hemmed in closely with mountains, and our work was confined to a valley two or three miles wide, in which there is no good farming land, however, a half



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dozen settlers have each a few acres under cultivation. In places the river has many channels and low flats flooded at high water, but where the river banks are higher the land is sandy and dry. At high water the Athabaska, as well as all the smaller rivers, carry a great deal of suspended matter, a sort of fine clay silt. There is very little good timber between Brulé lake and Miette river, but some small spruce grows around the mouth of Rocky river and a few acres of spruce of good size is found around the northeast corner of section 34, township 48, range 28, which is contained in a timber berth. Hay is very scarce and is almost confined to a few muddy sloughs in township 47, range 1, west of the sixth meridian. Besides the rivers, small mountain streams are plentiful and supply the best of water. There are no valuable water-powers, but power in small quantities could be developed from small creeks which have a rapid fall down the mountain sides. The climate is moderate and is characteristic of the mountains, as innumerable small showers occur but no heavy rains. As far as we could learn the whole Athabaska valley in this vicinity is subject to summer frosts except a small area near Henry House, where perhaps some combination of winds down the Miette, Athabaska and Maligne valleys keeps the temperature above freezing point till late in autumn. Wood fuel is everywhere plentiful. Some veins of lignite were seen along the Athabaska, the thickest being about three feet, in township 51, range 25. Large deposits of better grades of coal are said to be found up Fiddle creek in township 49, range 27. No stone-quarries were opened nor were any minerals noticed.

The Miette valley lies nearly due east from Yellowhead pass to Athabaska river. The valley itself is very narrow, usually about twenty chains and the railway follows the river closely, mostly along the north bank. On the south side, Miette mountains have an even, steep slope almost to the river; this slope facing the Athabaska is covered with brule, then comes about six miles of small jackpine, then larger jackpine and lastly some spruce six to fourteen inches in diameter as far as the pass. On the north side a range of rocky foothills stretches between the river and the mountains. These hills are usually very rough and covered with brule or willow and poplar scrub in ranges 1 and 2, and with brule and jackpine four to eight inches in diameter in ranges 3 and 4. Scattered spruce up to sixteen inches in diameter is found in the river flats across range 2, but this is included in timber berths Nos. 1335 and 1336. A few large fir are scattered along the hills facing south on Miette river, and these are practically the only timber of value on timber berth No. 1333 at Dominion creek in range 3. A number of large hay sloughs occupy most of the valley in range 3, but all are very wet. Fresh water is plentiful and water-power might be developed from many of the creeks, to a small extent, but all the creeks at high water are very muddy and carry many times their ordinary volume. The climate is characteristic of the mountains, as many small showers and drizzly rains occur but no heavy downpours, and the district is subject to summer frosts. Wood fuel is everywhere plentiful. No stone-quarries are opened, but a number of mineral claims for graphite are staked along Dominion creek. The 'Ore' looks like an ordinary slate, but some of it is quite black and has many small specks of mica as from a decomposed mica schist and when weathered it has a greasy appearance. The slate contains a very small percentage of graphite, if any; it could be handled by steam shovels, and water-power is convenient for washing, &c.

Game on the Athabaska and Miette rivers is scarce on account of the proximity of the pack trail, and the presence of a number of half-breeds, who, as one of them expressed it 'live by their guns.' However, now that Jasper Forest Park reserve is protected by game regulations, we may sometime again see what settlers fifteen years ago saw, flocks of mountain sheep and goats on the hills facing the Athabaska, with many varieties of other game such as deer, black bears, beaver, marten, porcupine and the feathered varieties, and back among the mountains caribou and grizzly.



## APPENDIX No. 28.

## EXTRACTS FROM THE REPORT OF A. McFEE, D.L.S.

## SURVEYS IN WESTERN ALBERTA.

I commenced work by running a meridian north from the eleventh base along the east boundary of townships 41 and 42, range 19, west of the fifth meridian. Along the streams in those townships the valleys are open with more or less scrub willow and good grazing for stock, but no hay, and they will average about half a mile in width. The hills and ridges between those valleys are covered with heavy timber, spruce, jackpine, balsam and fallen timber. Those hills and ridges which lie between the Bighorn range and the Rocky mountains are high and rough, and the soil is light and stony, but in the valleys the soil is fairly good. I do not consider the district anywhere along the Brazeau streams and between the two ranges of mountains will be suitable for agricultural purposes, for there was frost and hail nearly every week all summer. There is coal all along the streams in abundance; it can be seen cropping out all along the hillsides and there are mountains of limestone along the Bighorn range, with some good timber scattered over the hills nearly everywhere.

The water is the very best, and along the larger branches of Brazeau river are to be found trout in abundance up to six pounds in weight. Mountain sheep, goats and smaller deer are found, but spruce partridge was the only small game noticed.

No water-powers were noticed. The descriptions of those two townships are very much alike, with the exception of a portion of the northeast corner of township 42, which is crossed by the Bighorn range of mountains.

Township 40, range 18, is similar to 41 and 42, range 19, except that the timber is smaller and very much of it fallen. The east boundary of township 39, range 18, runs through more open country, especially near Bighorn river, which flows eastward through the northern portion of the township, as well as the northern portion of township 39, range 17, for about half way across the range; from there it bears southeasterly. The southeast portion of this township has good soil; it is partly covered with small poplar and willow and has the best of water. It is suitable for mixed farming and is much lower in altitude than the Brazeau country.

There are indications of coal along the streams and sidehills. Some scattering trees of good spruce grow, but as a rule it is much lighter than in the Brazeau district where we were.

The falls on Bighorn river are grand and would furnish great water-power; they are situated on section 28, township 39, range 17, west of the fifth meridian. The river above the falls is about twenty-five feet wide and eighteen inches deep and flows at the rate of five to ten miles per hour, according to the height of the water. It takes a drop of fifty feet into a large basin, and one hundred and fifty feet from the first drop it takes another of thirty feet, both nearly perpendicular. There are several smaller falls and rapids immediately below.

Township 40, range 17, is very rough and broken with ravines and mountains. The Bighorn range lies nearly diagonally across the township from southeast to northwest, the east boundary of section 23 running over the summit. The east boundary of sections 25 and 24 runs through a belt of good timber, some trees being as large as thirty inches in diameter, and I would say there is about one million feet of spruce and jackpine.

No minerals were noticed, and good water is found all through this district. Some large game, mountain sheep, goats and small deer were seen, but spruce partridges were the only small game noticed.

This district can be reached by way of Rocky Mountain House, Prairie Creek, Morley and Laggan.



## APPENDIX No. 29.

## EXTRACTS FROM THE REPORT OF GEO. McMILLAN, D.L.S.

## BASE LINE SURVEYS IN NORTHWESTERN ALBERTA.

I arrived at Athabaska Landing on March 31 and proceeded up Athabaska river. The ice was good and no difficulty presented itself until Little Slave river was reached. This is an unsafe river to travel except in the middle of winter and was at this season abandoned by freighters. The land road was heavy and at times we chanced the ice on the advice of an experienced freighter who was travelling with us. Thus we reached Sawridge on April 7, where we remained for two days to rest the horses, and then proceeded across Lesser Slave lake. The ice on the lake was in prime condition, black and glossy without a particle of snow on it, and in three days Grouard was reached.

The roads to Peace River Crossing were heavy and miry, and this journey occupied five days. There was no more good wheeling till I reached Grand Prairie. The ice on Peace river was solid till May 4, and I crossed it at Dunvegan on May 2. Not in the recollection of the oldest resident had the ice remained strong so late in the season. Two days later I reached Spirit river and remained there till May 24. This delay was caused by the streams ahead being in flood and a dearth of horse feed farther on.

On May 31 I reached Saskatoon lake on Grand Prairie, procured supplies from the Hudson's Bay Company and proceeded towards the eighteenth base line. Horse feed was no longer a problem, as the grass was by this time well grown and the only obstacle was the crossing of Wapiti river. There is a crossing on this river about six miles south of Flyingshot lake, and a rude pack trail leads therefrom, crossing the eighteenth base about the middle of range 8. The Red Deer is a large river, very deep and swift, and the supplies and dunnage were crossed on rafts. The horses swam across, and being unable to land, returned three times. On the next day, June 4, the horses succeeded in landing and three days later the starting point on the eighteenth base line was reached. Three miles of range 8 were retraced and the new work was begun on June 9. There were no obstacles on this line, thirty-one miles having been completed in twenty-nine days. The district traversed by the eighteenth base has not long since been overrun by forest fires. These fires have made a pretty thorough cleaning up. To the north of the base line the land is adapted to stock raising and farming, to the south it is very rolling, gradually becoming more so and finally developing into the foothills.

At present this district is a most backward place to settle in because Grand Prairie offers a better inducement. I think settlers will not go south of Wapiti river till that district is tapped by a railroad. It is suitable for subdivision, but this is not urgent at present.

I began work at the northeast corner of range 9. This range comprises a series of low ridges and small muskegs. The soil is clay and sand with the loam burnt off. Grass and fresh water are abundant. There remains no timber of any value except in the valley of Wapiti river where there is some good spruce and poplar. One branch of the Jasper trail crosses the base line on the north boundary of section 34.

Range 10 is very similar to range 9 and in section 33 the base line crosses Dead Pinto creek. This creek rises in the muskeg south of the seventeenth base, and like many streams in northern Alberta it had a strong current and deep banks of at least



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three hundred feet. Coal crops out in several places, but the seams are thin. There is considerable spruce in the flats of this creek.

Range 11 is quite rolling to the south and to the north as far as Wapiti river. This river crosses the base line in section 32. The water level is four hundred feet below the upper level, the west bank is abrupt and the valley is about one hundred and twenty chains wide. After crossing the river a thick poplar scrub is entered and the soil is deep and rich. This condition prevails and improves as Grand Prairie is approached. Some small patches of green timber remain in this range. They are surrounded by marshes and so escaped the fire. A branch of the Jasper trail crosses the north boundary of section 33.

Range 12 is similar to range 11, but its elevation is greater and vegetation is ranker. There are more open patches and some small areas of green timber. The loam has not been burned away as is the case farther east.

Callahoo creek crosses the base line six times in this range. There is coal along this creek almost everywhere and in several places the bottom of the creek is a bed of coal.

Range 13 and fractional range 14 are still higher in elevation, more rolling and more densely timbered. There is a good pack trail crossing section 36 in range 13, which leads to Saskatoon lake.

The land, I think, that is adapted for subdivision is all north of the eighteenth base line west of Red Deer river. It is well wooded, but there is plenty of hay and water to make stock raising a success. The remainder of the district will fit in well as a forest reserve.

The eighteenth base was completed on July 6 and I proceeded to the starting point on the seventeenth base travelling by Saskatoon lake which I reached on August 2.

I had an experienced guide and his route was east from Saskatoon lake across Smoky river below the mouth of the Simonette. This was done and he lead us up the Simonette pack trail to the mouth of Moose river, thence up Moose river till within four or five miles of the northeast corner of township 64, range 1, west of the sixth meridian. My first work there was to move this township corner 16.70 chains north of where I found it and to run the north boundary of township 64, range 27, west of the fifth meridian. I ran this line twice as the first time I did not strike the post. I was unable to observe on this work as it snowed, rained or hailed almost continually and the electrical disturbances were alarming. This line traverses a dense wood with some splendid spruce, jackpine and balsam. It is really the original forest and it took four days to run about two and one-half miles with twelve men chopping. This great forest extends through range 1, west of the sixth meridian and turns into a deadfall about five miles north. The soil is of poor quality, being a dead gray clay overlaid with moss. This forest is too wet to burn, but the surrounding forests which are sufficiently dry have been burned over. Similar conditions prevailed over all my work. This forest extends through range 1 and the farther west the smaller the timber. However it is green as far as Moose river in section 31.

This river has its origin in the muskegs to the south and the water is of a dark brown colour. It has a swift current, is shallow and about fifty links wide at low water. Its valley is about half a mile wide and one hundred feet deep, but its banks are not abrupt. To the west there is a tremendous deadfall extending in an unbroken stretch through range 5.

There is some green timber yet in the valley of Smoky river, but the great fire that swept that district must have jumped the Smoky as the ruins on either side are identical.

This is the largest river in that part of the country. It crosses the base line near the northwest corner of section 33, range 3. It is swift and dangerous in low water and its bed is strewn with boulders. Our crossing was made on rafts while the



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horses swam. The line does not cross the valley at right angles, but follows it for about three miles; this valley is over six hundred feet deep.

Porcupine river joins the Smoky about four miles farther down than the crossing. The Porcupine is a cold, crooked, rapid river and the water a beautiful green. The line crosses it three times in a distance of two miles. Its water level is very unsteady and will rise and recede three feet in twenty-four hours. The valley is about five hundred feet deep and one mile wide. There is considerable good timber north of the line and between the two rivers, also about five miles to the south is a berth about six miles long and two miles wide.

The next stream is Cutbank river and its name is very suggestive. While the bank on one side is cut out of the clay the other spreads out into a flat and this condition alternates with respect to the sides. The water is a dark brown colour and the river runs almost parallel to the base line, crossing on the north boundary of section 31, in range 5. North of Cutbank river in ranges 4 and 5 is the largest timber berth observed. It is a valuable one and is known as the 'big mountain' berth. Cutbank river is the last large stream up to the middle of range 9.

Of the eight and one-half ranges of this base there is no land that could be called good farming or ranching land. The life has been burnt out of the soil and the grass is weak and puny. I would not have stopped work where I did except for a dearth of horse feed as there is positively nothing for a horse to live on in those burnt jackpine ridges. I left for Flyingshot lake on the last day of October and at the time the ground was frozen and there were flurries of snow several times a day. I reached Flyingshot on November 6 and proceeded to inspect contract subdivision surveys on Grand Prairie. On December 24 I finished the inspection, having examined one hundred and fourteen miles. The next day I left for Edmonton which I reached on January 21.

Grand Prairie is not one vast treeless plain as may be presumed, it is about sixty miles long, twenty-four miles wide and is scrubby. The vegetables and grains that mature in southern Alberta mature there also and stock raising is a specialty.

Coal is the only mineral that I noticed and there seems to be no scarcity of it. The game comprises ducks, geese, moose, bears, foxes and beaver. The climate is said to be milder than that of the country north of it.



## APPENDIX No. 30.

## EXTRACTS FROM THE REPORT OF A. L. McNAUGHTON, D.L.S.

## RESURVEY AND RESTORATION SURVEY IN CENTRAL SASKATCHEWAN.

May 22 we began retracement surveys in townships 46, 47 and 48, ranges 3 and 4 and township 44, range 3, west of the third meridian, which kept us engaged until January 19. The weather during the latter part of June and the early part of July was very unfavourable, rain-storms occurring nearly every day and sometimes there was a steady downpour for two or three days in succession. However, with the exception of this short period of three or four weeks, the weather during the season was all that could be desired, bright sunny days succeeding one another with almost monotonous regularity. Besides being of assistance in our work, this weather was a great boon to the farmers, turning what had threatened to be a poor season for crops into one of the best on record. In spite of the late spring, zero weather having prevailed until near the end of April, the crops ripened from a week to ten days earlier than usual.

Warm weather prevailed during October and the early part of November, but on the night of the 11th came the 'freeze up,' the thermometer recording 20° below on that and several subsequent nights. In a couple of days Saskatchewan river could be crossed on foot and in about a week it was safe for heavily loaded sleighs.

The district is badly cut up by lakes, these two townships alone containing nearly forty of them varying in perimeter from one to ten miles. As the shores were covered with dense brush, the traverse would have proved a very laborious task in summer but was finished very quickly on the ice, the greatest obstacle being the unusual depth of snow, which made the walking to and from camp very heavy and shortened our hours of work which were at this time of the year, none too long at best.

The townships resurveyed during the season are most conveniently reached by way of Duck lake. The trail to Carlton ferry passes through the centre of township 44, range 3, and the trail to Wingard ferry branches off the Carlton trail in this township.

Although the labour of clearing and breaking land is much greater than on the prairie, the settler may feel more assurance of uniform returns for his labour. I have been told by settlers who formerly lived in Manitoba that the crops ripen about ten days earlier in this locality. If that be the case the danger of summer frosts is much lessened and indeed throughout all the district surveyed I have not heard any complaint of loss on account of frost or hail. This township is largely settled by French Canadians, some of the older members of the families being unable to speak more than a few words of English. All seem prosperous and contented and a fine Roman Catholic church is located about the centre of the township.

Turning to the right off the Carlton trail and following the Wingard trail for about seven miles we entered township 46, range 3. Here the trail follows the road allowance between sections 5 and 6 for half a mile and then turns to the northwest towards the ferry. This township is one of the first settled in this district, some of the settlers having located there upwards of twenty years ago.

The ferry across Saskatchewan river in section 6 has proved a great boon to farmers on the north side of the river. Although the banks are two hundred feet in height the approaches to the ferry are so well graded that heavy loads can be hauled



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up the banks with little difficulty. Within a hundred yards of the ferry on the north bank of the river, the road crosses the boundary line and enters township 46, range 4. The easterly part of this township is fairly level and well settled, but the westerly part is more hilly and broken by lakes, sloughs and muskegs. There are no settlers in this part as yet. A trail was surveyed across the township this summer extending from Skipton post-office in township 46, range 5, to Wingard ferry.

In section 20 of township 46, range 4, a trail branches off the Skipton trail to the right and enters township 47, range 4, in section 5, thence proceeding to Park-side post-office at the northeast corner of section 31.

Township 47, range 3, is reached by a road turning to the right off the Skipton trail at Silver Grove post-office. It may also be reached by taking the Shellbrook trail from Prince Albert and turning to the south at Shellbrook. The settlers in this township are of English and Scotch origin and are rapidly building up comfortable homes for themselves. All seem contented with their surroundings and satisfied with the measure of prosperity they have attained since coming to this country.

During the period covered by the season's operations the temperature varied from 90° above to 47° below zero, these extremes, however, continuing only for a short time. In general the climate was very enjoyable on account of the large proportion of bright sunny days. Very seldom does one encounter the hot sultry weather so common in moist climates and even the extreme temperature encountered in the winter months is mitigated by the clarity and dryness of the atmosphere.

Immigrant settlers from almost every part of the civilized world, delighted by the fertility of the soil and the opportunities of acquiring a competence, are fast becoming loyal and progressive Canadian citizens.



## APPENDIX No. 31.

## EXTRACTS FROM THE REPORT OF L. R. ORD, D.L.S.

## TRAVERSE OF LAC LARONGE.

Montreal lake and river are not at all difficult to navigate; the Hudson's Bay Company's sketch map showing the rapids and dangers thereof is misleading for the spring and summer stages of the water at the present time. The river would no doubt be more dangerous at low water, but it will probably keep its present level for a year or more, as the lakes are all high. Any skilled canoeman can go down or up the river, going down with fair loads and up with half loads; Montreal rapid is usually passed by portaging in order to save time.

There is said to be another lake, about twenty or more miles long, to the east of lac LaRonge, and separated from it by a 'narrows.' To the west is a lake, twenty miles long from end to end of its cruciform bays. The majority of the mining claims are said to be on the latter lake. The instructions permitting me to make a survey of this lake, instead of continuing the survey of lac LaRonge, if I thought it advisable, were received too late to be acted upon. However, I did not think it advisable, as I believe the existence of valuable mineral lodes there is all hearsay, and as usual many of the yarns are 'wildcat.' I would suggest a skeleton survey, either in summer or on the ice, based on the reports of Mr. McInnes, of the Geological Survey, and others; the details can be filled in later as desired.

The timber over most of this district is small and of no value, and I believe the geological horizon of the rocks to be so low that very few deposits of real value will be found. It is my opinion that the large finds of precious metals are mythical, if indeed they have not been 'salted.' The rumors appear to have been started with a view to 'booming' the place.

Many of the claims are worthless, and many are staked by men who have no intention of complying with the regulations. They hold the claim as long as possible without doing any work on it and then have it relocated by a friend or partner.

The widespread extravagant stories, which when sifted, have not even the proverbial grain of truth, have attracted a number of prospectors, many of whom do not know a coal seam from a bed of hornblende rock, with the result that many worthless claims have been staked out at considerable expense. Attempts were made at Mineral island, at Long point, and wherever claim posts were found, to tie them to the survey; it was easy to tie to posts, but much more difficult to tie to each separate group of claims as instructed. Most of the prospectors seem to have been too lazy or too ignorant to cut a line from one post to another; they have simply planted a post, scribbled a few remarks on it in lead pencil as to what post it is and added some nonsensical note, such as 'reflectory ore,' &c. Consequently the claims lap and overlap when plotted according to the marks on the posts, and therefore it was deemed more advisable to push on with the survey than to waste time trying to unravel the tangle of claims. The groups of claims were found on the ground to be very different from those shown on the plan of claims accompanying my instructions. Claims that are in reality on another lake are grouped in on the plan with claims on lac LaRonge, while claims in one place on lac LaRonge are shown with others at a considerable distance away. The tracing out and survey of these claims will be costly work, and it is suggested that a close inspection be made and those claims cancelled where the law has not



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been complied with. To put in a charge of dynamite and blow out a few yards of rock satisfies the requirements in the opinions of some claimants with exceedingly elastic consciences.

Lac LaRonge lies in a series of metamorphic rocks, schists, gneisses, &c., whose beds are considerably uptilted so much so at the northern part of the lake that they are overturned past the vertical. The geological strike of the strata is approximately northeast and the axis of the bays, points and islands, in a measure follow the strike, most of them being longer northeast and southwest. The verticality of the rocks and their durability in some cases and friability in others have produced a most irregular shore line, to delineate which with accuracy requires numberless sights. At one point on a convenient reef or islet a good sweep of shore could be covered from one 'hub'; at other times we had to crawl around a point with a series of short sights, sometimes cutting the overhanging trees and setting the transit in two or three feet of water.

Going northward from the Mission, the elevation of the points and islands is comparatively slight; proceeding northward farther from the edge of the overlying horizontal stratified rocks, the land rises gradually, but nowhere very high, probably rarely reaching one hundred feet above the water. The surface is all rock, only a few points occurring, with soil of clay and particles of sand; these points are of small area and of little value for agriculture. In the bays there are patches of muskegs here and there which break the monotony of the rock. The timber is inferior and of little value; it appears that the original timber was burned off fifteen or eighteen years ago, and is now replaced by a growth of poplar and white birch. The spruce and jackpine in the patches of the original timber that yet remain rarely reach a merchantable size, and all the timber may be classed as fit only for local use.

The lake abounds with whitefish, lake trout, pike and doré, some being of large size. Game is scarce, with the exception of the ruffed and Canada grouse.



## APPENDIX NO. 32.

## EXTRACTS FROM THE REPORT OF T. H. PLUNKETT, D.L.S.

## SURVEYS IN THE RAILWAY BELT, REVELSTOKE DISTRICT, BRITISH COLUMBIA.

My first work consisted of the survey of the easterly limits of sections 20 and 29, township 20, range 9, west of the sixth meridian. A considerable portion of these sections, particularly section 29, lies well up on the Larch hills and for this reason is almost useless for farming; it is useful, however, for grazing land. Along the base of the Larch hills in these sections there is some first-class farming land. In this district a quarter section is often applied for when ten to twenty acres would include all the land adapted to farming. The soil is so fertile that twenty acres is considered ample to afford the owner a good living. I found that the applications for land in this vicinity, which included land in sections 6, 16, 20 and 29, township 20, range 9, and sections 1, 2 and 3, township 20, range 10, west of the sixth meridian, were applied for in the hope of working from ten to fifteen acres for fruit lands and using the remainder, where the topographical features rendered farming impossible, for grazing land. The fact that homesteaders are willing to exercise their homestead privilege when they know that such comparatively small areas are all that they can expect to find adapted to farming operations is easily explained when it is known that land in the valley of Canoe creek between the Larch hills and Mount Ida is selling at present from one hundred dollars per acre for uncleared land to one thousand dollars per acre for lands planted in orchards.

The climate is well adapted for the raising of fruit of all kinds. No summer frosts are to be feared, and the rainfall is sufficient for fruit raising and general farming.

Along the base of Mount Ida there is a considerable quantity of merchantable timber, and a small sawmill on Canoe creek gives the settler a ready supply of lumber for building purposes.

These remarks, regarding climate, summer frosts and timber supply, apply also to the land along Salmon river where our next work led us.

The valley of Salmon river extends southwest from the shore of the Salmon arm of Shuswap lake up along Salmon river between Mount Ida and the Spa hills. This valley at the town of Salmon Arm attains a width of from six to eight miles, but gradually narrows to a mile or two in width as it ascends the river.

The beautiful dairy and fruit farms, especially those in the vicinity of the town of Salmon Arm, present in summer a picture well worth the effort necessary to scale Mount Ida from whose first benches a remarkable view of the whole country can be had.

However, all the bottom land in this valley having been taken up, the new settlers are turning their attention to the extensive bench lands. Mount Ida on its eastern slope, facing Canoe creek, rises somewhat precipitously, but on its western slope above Salmon river are to be found large benches. This is even more characteristic of the Spa hills on the opposite side of Salmon river and particularly so in sections 6 and 7 of township 19 range 10, sections 30 and 31 of township 18 range 10 and sections 13, 14, 23 and 24 of township 18, range 11. It was in these last mentioned sections that most of our work this season was located. A number of settlers are already squatted on this land making a success of mixed farming, but fruit farming has as yet not been given a trial. The soil is not so rich as that in the bottom



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lands, being inclined to be sandy, but when irrigated, however, it is found to yield abundantly and no doubt in the near future will afford ample evidence of its value as a farming and fruit raising district.

Water for irrigation which is absolutely necessary on the benches is easily available from the numerous streams flowing from Mount Ida and the Spa hills, into Salmon river. A considerable portion of the land is still open for intending settlers, while in the valley some first-class land is offered at prices which, considering its producing value, seem reasonable.

The bench lands are wooded with scattered bull pine while in the bottom lands merchantable cedar, fir and spruce are to be found. Logs can be driven on Salmon river to sawmills which are in operation along the river nearer Salmon Arm.

The land in sections 29 and 32 of township 20, range 10, is also bench land. Some beautiful farms and orchards are to be found in this locality west of Adams Lake and Neskainlith Indian reserves. Here one has ample proof that irrigated bench lands scarcely take second place to the bottom lands in point of worth as producers of farm and orchard products.

Nestled in the midst of the districts just described and ideally situated on the slopes overlooking Salmon arm of Shuswap lake lies the thriving town of Salmon Arm. Situated on the main line of the Canadian Pacific railway this town affords a ready and convenient market for all kinds of farm, garden and orchard produce for the raising of which the land in its immediate vicinity has proved itself well adapted. Good roads lead from the town up Canoe creek and Salmon river valleys as well as to the lands west of the Indian reserves.

At present, ample employment is afforded at Salmon Arm at the building trades, and also in the sawmills and lumber woods in the vicinity.

Salmon abound in Salmon river during the annual run and plenty of trout are always to be had in the Shuswap lakes. Bear, deer and mountain goat are also plentiful in this district.

The Salmon Arm district with its most favourable climate, good roads, splendid market and shipping facilities resembles very much the famous Okanagan district to the south and east of it, and bids fair in the near future to successfully rival the Okanagan as a fruit raising district.

After completing the surveys around Salmon Arm we took the Canadian Pacific railway for Revelstoke where the survey of fruit lands along Columbia river south of Revelstoke occupied us for the next few months.

Commencing about twenty-four miles below Revelstoke these fruit land surveys were carried on in the valley of Columbia river up to within a mile or two of the town of Revelstoke.

The bottom lands in the valley range from a mile and a half to two miles in width. Generally speaking the land is covered with a dense undergrowth and heavily timbered with very large cedar from four to twelve feet in diameter and hemlock from three to four feet. The soil in some places consists of a rich black loam, but generally speaking it is inclined to be sandy. There is no doubt but that the land is well adapted to fruit farming. During the present season small fruits such as currants and strawberries, though as yet only raised in small quantities, were of exceptionally high order as regards size, colour and flavour. In only one locality in this valley has apple and plum growing been attempted as yet, namely in section 29 of township 20, range 29. The orchard is from ten to fifteen years old, and the returns have been exceptionally good. Conditions are the same as those in the upper portions of the valley and no doubt bespeak success for this district as a fruit country.

On the other side of the bottom lands extensive benches have been subdivided. The clearing is easily done, the timber consisting of small poplar, spruce and birch with some brush. The soil, generally speaking, is a sandy loam with a gravel subsoil, and irrigation either on the benches or in the bottom lands is not necessary. Summer



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frosts do not exist. The winters are sometimes cold but the exceptionally heavy snowfall in this district coming before the frost has entered the ground to any considerable depth insures the successful protection of the orchards from frost, keeps the ground warm and gives an important stimulus to spring growth.

The river is navigable throughout this district and the Arrowhead branch of the Canadian Pacific railway following the left bank of the river affords excellent transportation facilities. Wagon roads have as yet not been constructed farther than six miles below Revelstoke.

Excellent markets for farm and garden produce of all kinds are already established at Revelstoke where the demand far exceeds the present local supply while there is, with the present facilities for shipment to the prairies, no chance of an over production.

Plenty of employment at good wages is to be obtained in the mills and lumber woods during the entire year. Three large mills are in operation at Arrowhead, while the town of Revelstoke, where two large lumber mills are located, presents plenty of employment in all trades.

Concurrently with this work, we were engaged on timber berth surveys on Cranberry creek. There are a few fairly good locations for homesteads on this creek, but the quantity of farming land is limited.

Our next work was in township 25, range 20, west of the fifth meridian where we were engaged for a short time surveying sections 19, 20, 21, 28 and 29, and in section 36, township 24, range 20, and sections 30, 31, 14, 15 and 16 of township 24, range 19.

The work in this district was all on the benches where farming operations are as yet in the experimental stage. Summer frosts are here met and irrigation is necessary during some seasons.

During our surveys here we noticed small patches of vegetables planted by someone desiring to test the producing power of the soil and the effect of the summer frosts. It was evident, however, that the experiment had not received as much attention during the growth of the vegetables as would have been advisable. However, it shows that the attention of settlers is being drawn to these benches which offer good opportunities to settlers, if the summer frosts are not too severe. In most places plenty of water is easily available for irrigation.

A first-class wagon road from Golden up the valley to the Windermere district, affords the settler exceptionally good transportation facilities by land while Columbia river is navigable and steamers run tri-weekly between Golden and Windermere. A railway up the right bank of the Columbia river is now under construction.

Employment in the lumber woods along the river is obtainable during the entire year while a large modern lumber mill at Golden also affords work.

We next moved to the mouth of Blaeberry creek in section 30, township 28, range 22. Our work in this locality consisted chiefly of traverse work on Columbia river.

The climatic conditions are about the same as those just described in townships 24 and 25, ranges 19 and 20.

Some farming is being done, the principal crop being hay for which there is always a large demand in British Columbia. A new departure is being made here in hay raising along the Columbia. Along this river there are at intervals, large areas of land inundated during high water but which yield slough hay in large quantities in the fall. The trouble had been that during most seasons they do not dry up early enough to enable the hay to be harvested. At the mouth of Blaeberry creek there is an exceptionally large area of this slough hay land. The owner has constructed a system of ditches leading to the Columbia river through which the water is enabled to flow off quickly, as soon as the river drops. The slough in this way is sufficiently dry in the fall to permit of harvesting operations. It is found that if the hay is stacked in small stacks immediately after its being cut it cures in first-class condi-



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tion and makes excellent fodder. A ready market already exists at the coast for this class of hay and it would seem likely that quite an industry could be built up by working the areas on this river. The land east of the railway has been retained as a timber reserve.

From here we proceeded to township 17, range 27, west of the sixth meridian. Our first work was in sections 24, 25 and 36 of township 17, range 28. Land adapted to farming here is very scarce, but owing to the favourable climatic conditions and markets every available acre of land is being eagerly sought. Irrigation is necessary and in the older settled parts considerable expense has been incurred to provide water for the land. This is an ideal fruit district as no summer frosts occur.

The timber consists principally of bull pine with some fir along the creeks. There is an abundance of fish in Fraser river during the annual salmon run and game on the mountain sides is plentiful.

After completing the survey of these sections and some traverse work on the Fraser, we packed a small camp over the mountain into section 24, township 17, range 27, and surveyed parts of sections 15, 16, 22, 23 and 24. This land lies along the southerly branch of the Luluwysin creek, and its elevation is about two thousand five hundred feet above Fraser river, at the north boundary of section 18, township 17, range 27. It is well adapted for raising hay and root crops, and the surrounding country would make good grazing land. Roads are as yet not constructed into these sections but they could be easily built from the south.

From this work we proceeded through the valleys into the Hat Creek valley where we were engaged in locating lot 10, group 1. Considerable merchantable timber was found here consisting of bull pine and fir. This valley is favoured with a fairly heavy snowfall and is well adapted for fruit raising.

Fruit farming to a limited extent has been carried on with gratifying success. Several new settlers are located here and there seems nothing to prevent this locality from becoming a good farming and fruit raising district.

Our next work was at Canford on the Nicola branch of the Canadian Pacific railway. The amount of land adapted for farming except that already taken up in the valley, is somewhat limited, and as in almost every other part of British Columbia the settlers are turning their attention to the benches.

This district also is well adapted to fruit raising. In the valley of Nicola river efforts to raise fruit have been very successful. There is every facility for shipping by rail while a fairly good wagon road extends along Nicola river.

There is also considerable activity in coal mining a little farther up the valley and large quantities of first-class timber is within easy access. A mill recently burned is about to be rebuilt at Canford.



## APPENDIX No. 33.

## EXTRACTS FROM THE REPORT OF W. R. REILLY, D.L.S.

## RESURVEYS IN CENTRAL SASKATCHEWAN.

On Thursday, May 20, I started for township 49, range 21, west of the second meridian to complete the survey of this township. Following instructions received in 1908, a retracement was made of the south boundary of the township and a new survey of the east boundary, interior meridians and cross lines. My route was by the Fort à la Corne trail crossing the South Saskatchewan river by ferry at Mitchell's crossing, in township 48, range 23, following the trail to the centre of township 48, range 21, where I turned north into township 49 and began work.

The trail was in good condition with the exception of a few soft holes. I completed the survey of this township on June 14. Spring opened rather late, but warm dry weather immediately followed, making seeding conditions favourable, and growth rapid, so that by the middle of June crops were as far advanced as in many seasons where spring opened earlier.

Saskatchewan river enters the township on the west in the northwest quarter of section 19, flows southeasterly and crosses the south boundary at the southeast corner of section 2. Its width varies from about fifteen to twenty chains. Flood water rises from fifteen to twenty feet above ordinary summer height. Its banks vary from twenty-five to two hundred feet high. Generally where they are high on one side they are low on the opposite side. In places the high banks are bare and steep, with clay slopes right at the water's edge. Except on these cut banks a heavy growth of timber, scrub and brush grows right up to the water line. The varying heights, cut banks and timbered slopes form a rugged and picturesque outline to this mighty river. South of the river are two large flats, one in sections 21 and 22, and one stretching across sections 14 and 11.

The water in the river in this township is greatly increased in volume by the junction of the south branch, just west of the west boundary of the township. This naturally would add to its value as a water-power producer, although the natural features of its banks and current are not as favourable for developing power as on the north branch in range 22. A large amount of power could be developed but the cost would be excessive. As only a few sections are in any way fit for settlement, and these do not join other land fit for cultivation, it might be advisable to reserve the whole township, the south part to serve settlement to the south with building logs, fuel and fencing and the part north of the river for a future tie and wood limit.

Having completed the survey of the township on June 14, I started the following day for township 42 A, range 1, west of the third meridian, to make a retracement of that township. I took the trail south to Kinistino on the Canadian Northern railway then followed the trail skirting Carrot river, passing by Bonne Madone, Wakaw, and St. Julien post-offices. We passed through a rolling poplar bluff country, a large portion of which is thickly settled.

In making the retracement of the township, the majority of the old markings were found, but in many cases the markings were faint and fast disappearing. This is more noticeable in light soils and where stock range.

The south branch of the Saskatchewan skirts the west boundary of the township running northerly past the centre of section 18, where it makes a sharp turn easterly



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for over half a mile, thence nearly north crossing the north boundary of the township in the northeast quarter of section 18.

The north part of section 7 or the south part of section 18 presents a very feasible sight for a railway crossing, as an easy grade can be obtained on either side, without excessive work.

The river trail crosses sections 6, 7 and 18, but the old trails from Gabriel's crossing to old Humboldt which crossed sections 1, 11, 14 and 15 is nearly obliterated.

Fish Creek post-office is on the river bank on the road allowance, at the north boundary of section 7. A free ferry crosses the river at this point. It surmounts a breach in the road on a much travelled trail to Rosthern on the Prince Albert branch of the Canadian Northern railway.

The township is well settled with prosperous Galicians, with the exception of the river lots which are mostly occupied by French people. A Roman Catholic church is situated near the west end of river lot 12. Near the church is a new school which is well attended by the children of the district. Another school near the northwest corner of section 2, is largely attended by Galician children, who are readily learning to read and write English.

After completing this township I moved into township 41, range 1, to make a retracement of the whole township. Sections 31 and 32 are divided into river lots 1 to 8, numbering from the north. The northwest quarter of section 30 comprises a portion of river lots 9 to 12 which extend west to the river on the north half of section 25 in township 41, range 2. The south half of section 25 in the township is divided into river lots 13 to 16 inclusive.

Settlers on river lots in townships 41, ranges 1 and 2, were unable to locate their boundaries. The east end of lots 9 to 12, the west end of lots 1 to 8, range 1, and the west end of lots 9 to 16, range 2, were not posted in the original survey. General instructions for retracement would not cover this work.

The homesteads in the townships are nearly all occupied. Galicians are the principal settlers, but the majority of the odd sections are vacant. The soil is a rich sandy loam in most places, running into clay loam in streaks, while the subsoil is chiefly clay. On the whole it is a good township for settlement and settlers appear to be doing well and making good homes. Roads are being cleared and graded in many places and good farm trails run in all directions. A large Greek church is on the northwest quarter of section 22 and a Roman Catholic church on the southeast quarter of section 4. A public school is located on the southeast quarter of section 22, and Alvena post office is on the southeast quarter of section 18. Settlers in this township divide their trade between Rosthern on the Prince Albert branch, and Vonda on the main line of the Canadian Northern railway.

From June 20 to July 24, I was engaged in this district surveying townships 42 A and 41, range 1, and river lots in township 41, range 2. During this time excellent weather conditions prevailed, but heavy rains were frequent, followed by bright warm weather in the day time and no frost at night.

This is a good district for all kinds of grain raised in the country and for dairying and raising cattle and hogs.

On July 26, I started for township 36, range 1, west of the third meridian to investigate the condition of the survey in that township and to make a retracement of the whole township if necessary. I passed through Vonda on the main line of the Canadian Northern railway and between Vonda and this township the trail is crooked and hilly.

During the work the weather was ideal for growing crops, and in the south part of the township, which was cropped, grain was looking fine and gave promise of a good yield.

My next work was in township 45, range 28, west of the second meridian, and I travelled back through Vonda to Fish Creek, P.O. From there I took the road on



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the right bank of the river to Batoche, where I crossed the river and went back to Duck Lake settlement. From there the Prince Albert trail was followed until I was opposite the place and I went east across country into the township.

On August 27, I moved into township 45, range 27, and completed the survey of river lots 21 to 48 inclusive, into sections on September 8. Subsequently I returned to this township and included lots 13 to 20 inclusive within the survey, and completed the traverse of lakes, in this township and township 45, range 28.

The weather for the season was good, no frosts occurring to any extent and good harvest weather prevailed. No settlers were on any of the river lots included within the survey in this township, but the adjacent country to the north and east is well settled.

On September 9 I started for township 48, range 3, west of the third meridian in the Shellbrook district, to make a retracement of that township. After proceeding a few miles north of my camp, good trails were found in many directions, and going in a northeasterly direction for a few miles, I struck the trail from St. Louis to Prince Albert, passing on the east side of the Red Deer hill. Saskatchewan river was crossed at Prince Albert, on the recently constructed bridge, built for railway and passenger traffic, and from Prince Albert towards Shellbrook the road was good for six or seven miles; thence the trail became heavy sand passing through a jackpine country for about fifteen miles, but after leaving the sand the roads were good.

On reaching range 3 on the Shellbrook road, I turned south into township 48, and arrived there on September 11, three days after breaking camp on the South Saskatchewan.

The survey, with the exception of the traverse work, was finished on October 13, and the following day I started for township 45, range 27, west of the second meridian, having received your instructions to include in the changing of the river lots in that township into quarter sections, lots 13 to 20 inclusive, and also to complete the traverse work in townships 45, ranges 27 and 28.

It was reported that there were duplicate monuments on the north boundary of township 41, range 27, west of the second meridian, and I was instructed to make an examination on the ground. Before reaching Prince Albert I went ahead and took the train from Prince Albert to Rosthern, drove from there to Wakaw, found Mr. Kuzneruk, who had reported the matter, but found that no duplicate monuments existed, as only two lines had been run, a random and a true one. I returned to township 45, range 27, and completed the surveys in that township and traverse work in the adjoining one on October 27.

My next work was a correction survey of the south two-thirds of township 49, range 12, west of the third meridian. My best route appeared to be by Duck Lake settlement, Carleton crossing on Saskatchewan river, Aldina post-office on Muskeg Indian reserve, westerly to Bear lake, and northwesterly to the township.

On Friday, October 29, we got ferried across the river, and camped for the night on a hill, during a heavy snowstorm, the first of the season. Saturday, we reached the Indian reserve and camped there during Sunday. The snow was four inches deep and the ruts on the trail were drifted full. From the reserve to Bear lake, the country is very hilly, and travelling with wheels in the snow was difficult, but from Bear lake a faint trail northwesterly to the settlement south of Meeting lake.

The third day after leaving the reserve, I camped as near as I could to the southeast corner of township 49, range 12. Three miles of the south boundary of the township lay in the lake, but as there was no prospect of the lake freezing, so that I could chain across it, for some time, I was obliged to run an offset line on the north side to adjust the boundary and tie the interior meridian lines to.

On December 1, I took one man and a team with me to do the traverse work in township 48, range 3. I completed the work and returned to Prince Albert on December 13, and arrived home in Regina on the 15th.



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With the exception of one township in the open plain, the season's work was in much the same class of country and the whole district covered presents much the same general features. It is a rolling wooded country with patches of swamp, small lakes, and large and small prairie openings. Over this district the same climatic conditions prevail and throughout the season the weather was ideal for farming purposes. Frequent rains kept the ground moist, and warm, bright weather in June and July produced rapid growth. I did not see any frost after rains in the early part of the season.

The season in the wooded country is perhaps a little shorter and more temperate than on the open plains, as there is less wind and not the extreme heat throughout the day. Snow generally lies a little longer in the spring in the north, being deeper and falling a little earlier in the season. The wooded growth has a tendency to preserve moisture, and to cause frequent rains.

Experience is teaching the farmer different methods of treating the soil, so that unfavourable climatic conditions are to a great extent overcome. Thorough cultivation, early sowing, and the selection of early maturing kinds of grain will largely overcome the frost trouble.

The north country is, perhaps, the best place for the man of small means to start farming, as there is no outlay for fuel, buildings can be put up cheaply, and there is the chance of a man finding winter work in the woods if he wants it.



## APPENDIX No. 34.

## EXTRACTS FROM THE REPORT OF E. W. ROBINSON, D.L.S.

## SURVEYS IN THE RAILWAY BELT, BRITISH COLUMBIA.

As one travels westerly through British Columbia it is somewhat remarkable how the climatic conditions change within a short notice. For example, at Revelstoke, where I remained one day to purchase supplies, a foot of snow was still on the ground, the atmosphere was chilly and the country generally had a wintry aspect. Proceeding westerly the snow grew less until at Sicamous, on Shuswap lake, the ground was bare. The vegetation also shows a marked difference. The rank growth of alder, willow and other brush which characterizes the valleys in the Revelstoke district gives place to an open growth of the different varieties of the coniferæ, indicating less precipitation. As one proceeds farther west the change is still more marked. The timber becomes more scattered, deciduous trees disappearing almost entirely until Kamloops is reached. Here one is in the heart of the dry belt, where the hillsides support only a growth of bunch grass and sage brush with scattered bull pine. The precipitation here is so small that irrigation has to be employed for all crops. On the date I reached Kamloops I found that spring was well advanced, in fact, farming operations had been in full swing for several weeks. The short duration of winter in the dry belt is one of the many attractions which prove so alluring to newcomers.

After consulting Mr. J. E. Ross, D.L.S., and discussing the division of work outlined for the season, I organized my party and left.

Timber berth No. 532, for the survey of which I received instructions, lies on the east side of Adams lake. It extends in an easterly direction, crossing the divide between Adams lake and the north fork of Scotch creek, thence down Scotch creek slope and crossing the north fork of Scotch creek, rises from half a mile to two miles up the opposite slope of this creek. The major portion of the timber lies in the valley of Scotch creek; fires have destroyed what was once a magnificent belt of timber on the Adams lake slope, but there are still a few patches left, principally Douglas fir, hemlock and a little white pine. These patches, unfortunately, are very scattered, making the logging expensive. Stretching along the summit between Adams lake and Scotch creek excellent spruce is found up to thirty inches in diameter, with second rate balsam up to twenty-four inches. As one descends the Scotch creek slope the balsam soon disappears and cedar and hemlock are found. A few cedar up to twenty inches were discovered to be sound, but the majority are 'hollow butts.' The hemlock will average about fifty per cent unsound with a greater proportion than this at lower altitudes. The Douglas fir and white pine are the best of the varieties of timber in this limit, the fir reaching a size of sixty inches and the white pine forty inches. The white pine, although scattered as is generally the case in this section of the country, will run more to the acre than the average for this part of British Columbia.

The logging of the Adams river slope will not present much difficulty apart from the scattered nature of the timber, as the land is not very steep and the logs can be readily rafted on Adams lake. The Adams River Lumber company tow their log rafts to the south end of the lake where they have a dam across the mouth of Adams river. They drive Adams river to Shuswap channel, and through this to the western end of Little Shuswap lake, where their mill is located. The



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logging of Scotch creek slopes will be more difficult. It would be possible to take the timber from the higher land on the west side of Scotch creek to Adams lake through a low pass which is approximately in the southwest quarter of section 20. This would, however, entail a long haul, especially from the northern part of the limit. The most obvious route is, of course, *via* Scotch creek to Shuswap lake. This creek, although averaging from seventy-five feet to two hundred feet in width, is not well adapted for log driving. It is crooked, has low land adjoining, which is flooded at high water, numerous obstructions, such as rocks, rapids and sand bars, and although it has a large volume of water in the spring, it would be difficult, if not impossible, to hold it back until required. This, coupled with the cost of clearing Scotch creek, renders this route a poor one. Possibly a logging railroad along Scotch creek would be the best method as this would tap other valuable timber claims.

The soil is light sandy loam with considerable surface rock on the steeper slopes. The only land of any agricultural value lies on the Adams lake slope close to the lake; the remainder is of too high an elevation. Mixed farming should be successful here, and the hardier varieties of fruit could be raised. On May 23 snow was found in the bush to within half a mile of the lake shore, although the heat on the shore was intense.

The only market at present for produce would be the lumber camps on Adams lake, as the distance from the railway is too great for profitable shipping. Caribou, deer, black bear, lynx, marten and the smaller fur-bearing animals are fairly numerous, and Adams lake is well stocked with rainbow, grey and Dolly Varden trout, char and a few other varieties of fish.

On May 27 I proceeded to China flats, about twenty-five miles north of Revelstoke, to undertake without delay the survey of fruit lands in the Columbia valley. The land suitable for agriculture and fruit growing north of Revelstoke may be roughly divided into three sections: First, the Jordan flats, being alluvial land lying between Jordan and Columbia rivers with a strip of bench land along the west side of Jordan river; second, some bench land on the east side of Columbia river lying in sections 9, 10 and 15, township 24; third, a strip of alluvial and bench land averaging half a mile in width lying north along the east bank of Columbia river and stretching from the north boundary of section 3, township 26, to the northern limit of the railway belt. There are also a few isolated patches of good land, the two largest lying along the north boundaries of sections 23 and 26, township 24, the first one being known as Steamboat or Mosquito landing.

A stage road starts from Revelstoke and follows the east bank of Columbia river to Steamboat landing, a distance of about six miles, connecting with the provincial government pack trail, known as the 'big bend trail' which continues north. A steamboat during the summer months is operated on Columbia river, starting in the earlier part of the season from Steamboat landing, and in the latter part from the city wharf at Revelstoke.

Columbia river through this section of the country is a swift stream with numerous sand bars, rocks and rapids making navigation difficult and often risky. Lining up is employed to get up the worst rapids. The steamboat, which has a powerful steam winch in the bow, is first moved to the river bank below the rapids and a cable taken out along the bank and fastened securely to a tree or rock ahead. The boat is then swung out into the current, and with the combined power of its engines and the winch hauling on the cable manages to get through the rapids. The provincial government is at present building a wagon bridge across Columbia river at Revelstoke, and this will connect with a pack trail around the 'big eddy' on the west side of the Columbia, giving access to the Jordan flats.

The valley of Columbia river north of Revelstoke is well timbered with hemlock, cedar, Douglas fir, white pine and spruce. Fires have destroyed patches of timber all along the valley, approximately five per cent, which is considerably under the average amount destroyed by fire in the railway belt.



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The soil consists of from six to twelve inches of humus overlying sandy loam subsoil. In a few low lying spots and pockets there is six to twelve inches of rich, black muck with a heavy clay subsoil. Surface rock is showing, being specially noticeable on the steeper slopes. Mixed farming would undoubtedly prove successful, except on the Jordan flats, where the absence of creeks for irrigation would be a serious drawback during dry seasons. The hardier varieties of the standard fruits would flourish, and strawberries have been proved to be a very lucrative crop.

On July 24, I moved to the four-mile board west of Revelstoke to undertake the survey of timber berth No. 528, block 4. This timber berth is situated on the north slope of Mount MacPherson, about two miles from Columbia river, and from three to four miles in a direct line from Revelstoke. There is at present no direct communication by wagon road from Revelstoke, but the provincial government is now constructing a wagon bridge across the Columbia to connect with the existing wagon road on the west side of the river which runs to within half a mile of the north boundary of the limit. At present the easiest approach is by crossing the Canadian Pacific railway bridge over the Columbia, thence along the railway track to where the wagon road crosses at Griffith's ranch, situated three and a half miles from Revelstoke. From this point I cut a man-pack trail, going through Griffith's ranch and crossing Tonkawatla river which runs through the timber berth, touching the boundaries at several points. There is very little timber on the south slope of Tonkawatla river valley, a few scattered fir and hemlock having escaped the fire which at one time ran along the valley. The sidehill also is very steep with many precipitous rock bluffs, making the logging of any timber expensive if not impossible. Commencing at the summit between Tonkawatla river and its tributary south there is an excellent belt of timber consisting of hemlock up to thirty-six inches, cedar up to seven feet, scattered white pine and spruce up to twenty-four inches, and occasional Douglas fir up to thirty inches. This belt of timber extends southerly to about the centre of section 18, where the cedar and white pine become scarcer, balsam up to twenty-four inches taking its place. Farther south the only varieties are spruce and balsam up to twenty-four inches. The extreme southern end of the limit being the part lying in the south half of section 7, is entirely useless, being portion of a rocky ridge cut up by ravines and rocky bluffs.

The logging of this limit will not present any difficulties, the only drawback being its distance from transportation. The slope to Columbia river is not very steep and sleigh roads can be made quite easily. There is at present an old wagon road leading from the Big Eddy sawmill to a ranch in the southeast quarter of section 20 which might possibly be utilized.

The soil is a sandy loam with considerable rock in places, but the altitude would prevent the growing of any but the hardiest crops. Along Tonkawatla river is some marshy bottom land which would be difficult to drain as its elevation is only slightly greater than that of the river. On August 20 and 21, I moved the camp down to the railway track, and on the 24th pitched camp on the Jordan flats to complete the survey of fruit lands there, a description of which has already been given.

On September 6 I moved to Greely on the main line of the Canadian Pacific railway east of Revelstoke, to survey timber berth No. 528, block 3 and to do adjoining subdivision work.

This timber berth is situated on the north side of Illecillewaet river from four to six miles east of Revelstoke. The easiest approach to the berth is by train from Revelstoke to Greely and thence across Illecillewaet river by the wagon bridge which is about three minutes walk from Greely. There is also direct communication with Revelstoke by a wagon road which follows the valley of Illecillewaet river and passes through the southern portion of the timber berth. This road is in bad condition in some places, but the provincial government is now engaged in repairing and straightening it. The timber on this berth lies in two distinct sections. Commencing at the eastern boundary there is a belt about thirty chains wide and eighty-five chains long lying along the Illecillewaet river. This comprises hemlock up to thirty inches, scattered white pine up to



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twenty inches and cedar up to thirty-six inches. The hemlock will average sixty per cent unsound and the cedar, especially near Illecillewaet river, is hollow and punky. Some excellent Douglas fir at one time existed on the limit, but it has been logged off. The other belt of timber about two hundred acres in extent, occupies the northwest corner of the berth. This comprises Douglas fir, hemlock, white pine, cedar, spruce and balsam up to fourteen inches in diameter. Practically all of this timber is sound and although small will make good lumber. The remainder of the berth has been fire-swept, the only other green timber being some small patches of hemlock up to twenty-four inches, and small white pine and cedar along the north boundary of section 4.

The bottom land along Illecillewaet river is a rich clay loam with black muck in places. It is marshy and would require draining for any other crop than hay. It was reported to me that in spring most of the land is flooded. The timber has been burned, second growth fir, cedar, hemlock with willow brush now covering the land. The sidehill on the north side of the valley is not very steep and several good benches exist. The soil is a light sandy loam with six inches of humus where the land has not been burnt. The bottom land after being drained and cultivated for a few years should prove ideal for vegetable growing. The sidehill land would undoubtedly raise fruit of the hardier varieties, although the soil is somewhat light and manuring would be necessary. The precipitation in the summer is ample and the average snowfall is from three to four feet. Summer frosts occasionally occur on the bottom lands of the valley, but these will probably cease as the country is cleared and drained.

On October 7 I corrected the monuments on the east boundary of timber berth 528, block 4, according to instructions received. On the 8th I moved to Three Valley to survey the swamp lands lying in the south pass. I saw the applicant for these lands and he informed me that he had abandoned his application. I, however, inspected the lands and found that they comprised the head of a mountain valley about three and a half miles south of Three Valley and were about fifteen hundred acres in extent. A creek about one chain wide and six to ten feet deep meanders through the valley and flows into Frog lake. The banks of this creek are low and beaver dams obstruct its course with the result that all the adjacent land is flooded.

It would be possible to divert this creek before it enters the meadows and by a short canal to carry the water across the low divide and connect with Three Valley creek flowing into Three Valley lake. If the beaver dams were then destroyed the land would speedily be drained and would make an excellent hay meadow. The soil is a rich black muck with a sandy clay subsoil, but it is doubtful if it could be utilized for tillable crops as these narrow mountain valleys are almost invariably subject to summer frosts.

On October 11 I moved to Armstrong in the Okanagan valley and camped in section 23, township 19, range 9. The Okanagan valley is in the dry belt and irrigation has to be resorted to. Celery, onions and cabbage are largely grown and prove to be lucrative crops. The land surveyed in sections 13 and 14, 23 and 24, township 17, range 9, is all hillside and suitable only for cattle ranging. Dense second-growth hemlock, pine and tamarack is commencing to cover the higher land. Good roads from Armstrong and Enderby run close to the above sections. On October 18 I moved by rail to Enderby and the next day by wagon along the Mabel lake trail to Kingfisher creek and camped there. This trail follows the valley of Shuswap river and in a dry season is in excellent condition; a prolonged spell of wet weather, however, will make it almost impassable, the soil in places being a stiff clay. Most of the available land in Shuswap river valley is taken up, the settlers being engaged in mixed farming and fruit growing. Apples seem to do particularly well. In sections 14, 23, and 22, township 19, range 6, there is a fine level bench the clearing of which would be easy. The soil is light sandy loam but, as the summer rainfall seems to be ample, would, with care, produce good crops. In sections 10 and 15 in the same town-



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ship a gently sloping bench was found about two hundred acres in extent with an excellent clay loam soil. The best timber has been logged off and clearing of the land would be expensive. On October 25 I moved the party to Falls creek and traversed Shuswap river through section 2, township 19, range 7. On Falls creek a water-power exists capable of easy development. A head of six or seven hundred feet can be readily obtained. I did not, owing to a lack of time, investigate whether it would be possible higher up the stream to dam back the water until required. At this date the stream was about fifty feet wide and from one to two feet in depth.

On November 15 I arrived in Revelstoke to undertake the correction surveys on the west side of Columbia river, in township 23, range 2, west of the sixth meridian.



## APPENDIX No. 35.

## EXTRACTS FROM THE REPORT OF O. ROLFSON, D.L.S

## SURVEYS IN MANITOBA AND SOUTHERN SASKATCHEWAN.

I arrived in township 13, range 26, west of the principal meridian on the morning of May 14.

The township is well settled with prosperous farmers who have good houses, large barns and plenty of stock. Many of them have telephones in their homes. Miniota, the terminus of a Canadian Pacific branch line from Brandon is on the west boundary of section 31 and the Grand Trunk Pacific main line is less than half a mile north of the township.

On July 7 I left for township 12, range 5, west of the second meridian, to make a retracement and restoration survey there.

This township is on the northern edge of what the settlers call the 'Little Moose mountains.'

The settlers here are mostly Hungarians, living in log houses plastered with mud and whitewashed. These people are steady and industrious and will some day have good homes.

I left here on August 21, moving southerly to townships 1 and 2, range 12 and township 2, range 11, west of the second meridian. The trail through the Moose mountains, which are really only hills, passes through a small valley south of the 'Little Moose mountains,' then up the 'Big Moose mountains,' and crosses a plateau on the top. The crops here were excellent, being fully ten days in advance of what we had seen farther north. Small lakes and considerable bluff add to the beauty of the scenery. Descending the south side of the hills the trail passes Kisby, on the Arcola branch of the Canadian Pacific railway, then through level prairie to Estevan. From Estevan west the country is still level prairie, broken only by the valley of Souris river immediately south of the town.

The settlers in townships 1 and 2, range 12, and township 2, range 11, are mostly Germans, Bohemians, Norwegians, Swedes and Russians who have lived in the United States and immigrated to Canada.

After completing the work here I moved to township 7, range 8, west of the second meridian. This township is reached by a good road due north from Estevan and is about five miles south of Stoughton on the Canadian Pacific railway. The country is slightly undulating prairie with a small amount of scrub.

On October 1 I moved to townships 13 and 14, range 7, west of the second meridian. The Reston branch of the Canadian Pacific railway passes through both these townships and the Canadian Northern through township 14. I retraced both townships, then moved, on November 3, to township 15, range 9, west of the second meridian. Glenavon, a new town on the Canadian Northern railway, is about two miles south.

I left here on November 13 and returned to township 1, range 12, west of the second meridian to correct some errors.



## APPENDIX No. 36.

## EXTRACTS FROM THE REPORT OF J. E. ROSS, D.L.S.

## SURVEYS IN THE RAILWAY BELT, KAMLOOPS DISTRICT, BRITISH COLUMBIA.

Most of the land surveyed lies in the back valleys on the hills at an altitude ranging from two thousand to four thousand feet above sea-level, and is, I am somewhat reluctant to say, not suitable for general farming. The soil is not good, and the surface is much broken or hilly, but apart from this the many difficulties to be contended with, such as long hauling to the markets over heavy grades, lack of water for irrigation purposes and summer frosts, preclude the possibility of carrying on mixed farming successfully. Stock raising and dairying are the only branches of the industry that might be engaged in with profit, and these only on a small scale.

On March 15, I left Kamloops with my party to complete the survey I had left unfinished the previous season at Harper lake, where eight settlers had squatted. The land settled on consists of good bottom land, thickly wooded, and rolling hills lightly timbered. The settlement lies about four miles to the south of Shuswap station, at an elevation of about one thousand feet above the latter place. There is only a rough trail at present between the two places, but the settlers claim to have located a good road with easy grades that can be built at moderate cost. All the suitable land is now taken up.

From here I moved to Little Shuswap lake, where I retraced the boundaries of Little Shuswap Indian reserve and surveyed the adjoining quarter sections. The boundaries of the Indian reserve follow closely the foot of the high mountain to the south, leaving the strip of good land between so small that it is scarcely worth taking up.

My next move was to a small creek flowing into Adams river on the westerly side. I surveyed five or six sections here lying along the creek. About three miles up the creek there is a marshy meadow and considerable bottom land. With some drainage several sections could be brought under cultivation. There is some very large timber, cedar and fir, in this locality, which is included in a timber berth. Two settlers had camped here for a short time, and made some improvements, but apparently had abandoned them. The elevation above Adams river is about four hundred feet. At present there is only a pack trail, but a good road could be built at moderate cost. The lumber company will probably lead the way by making roads and clearing off the heavy timber.

The enterprise of the Adams River Lumber company is very much in evidence in this district. At the foot of Little Shuswap lake a large sawmill, fitted with the most modern machinery, has been built, while nearby, across the railway track, a town-site has been laid out upon which the new town of Chase is fast springing up. Water-works were being put in at the time of the survey. A steamboat and a launch or two have been placed on Shuswap and Adams lakes for the company's private use. A good road, six miles in length has been built between the two lakes, and a telephone line follows along this road. Adams river has been much improved for log driving, and a most substantial dam constructed near the head of the river. On Upper Adams river, where the bulk of the company's timber lies, equally extensive improvements have been made. The large expenditures made would indicate the company's intention to operate here on a large scale for many years.



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After traversing the right bank of Adams river and a part of the east side of Adams lake, I moved to the foot of main Shuswap lake. Between the lake and the high mountain to the south there is a considerable stretch of good land which has been taken up since the 'days of construction,' and is now thickly settled. The old survey was not altogether complete; I ran out the few necessary lines, completing the survey as far as Notch hill.

My next work was on the opposite side of the lake where I extended the old surveys up Meadow creek as far as Scotch creek valley. Three settlers have squatted here and are making fair progress. The bottom land along the creek is good, but the high land appears to be rather dry for farming.

My next camp was pitched on Mara lake. The land surveyed here lies along the east side. There is no road on this side of the lake, but Sicamous, the nearest station on the railway, can be conveniently reached by water. It seems strange to see, close to Sicamous, a considerable area of good farm land still in its primeval state. This farming land is held in provincial lots. The only reasons I can think of for no use being made of it are that it is held for speculative purposes, and that the mosquitoes make life scarcely worth living for about two months in summer.

I next made a survey in township 21, range 9, where a small creek flows into the Salmon arm of Shuswap lake. I carried the survey along the creek for several miles. There are two quarter sections along this lake suitable for farming. There is no road on the north side of the lake here, the only route being by water. Salmon Arm station and Sicamous Junction are the nearest railway stations.

On finishing the survey here, I went up Salmon river, making small surveys en route and establishing the boundary of the belt where practicable. At Ingram creek I carried the survey to the boundary of the belt where I found that a large meadow had been partly taken in provincial lots. The meadow is about two miles long and about a quarter of a mile wide, and the greater part of it lies within the belt. Farther up the creek, on a tributary, there is a smaller meadow. This has been squatted on by a settler holding a provincial pre-emption record. Outside the two meadows and the margin of bottom land surrounding them there is no land for settlement. The altitude is about four thousand feet above sea-level. A pack trail follows along the creek to the meadows.

From Ingram creek I moved to the end of the original surveys on Salmon river. From here I ran south to the boundary of the belt and connected with the survey made at Ingram creek. I then carried the survey up Salmon river to the east boundary of the Monte Hills forest reserve. From the latter place I ran a traverse along the river road to the boundary. Up to the reserve there is a narrow strip of good bottom land, but from here the mountains come down steeply to the river. Grande Prairie, the oldest and best settlement in Upper Salmon river valley, is ten miles long and from a mile to three miles wide. It is perfectly level and the soil is very productive. The farmers, however, do not seem to be so progressive as in other parts of the district probably on account of the lack of railway facilities. A syndicate were negotiating a deal by which they would acquire most of the land in the settlement. Their intentions were to subdivide the land into small holdings, and sell on easy terms of payment. In this way a much larger population could be accommodated. The syndicate proposed to put in an electric railway from Vernon and to build a large sawmill in the valley. It is to be hoped that the deal will be consummated, and the proposed projects carried out, as it would be a boon to the whole valley.

From Salmon river I went to Paxton valley where I made subdivisions on both sides of the valley. In sections 9 and 10, township 18, range 13, there is a small meadow and some good bottom land, but generally the land is not well adapted to farming. The scarcity of water and the distance from market will probably prevent the land from being settled on, for the present, at least.

After finishing the work in Paxton valley I made small surveys at Campbell creek, Back valley, Louis creek and Edith lake, all lying within a radius of thirty



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miles from Kamloops. The conditions and character of the country are very similar to those of Paxton valley and therefore will not require any particular description.

The weather conditions throughout the season were favourable for surveying, but the spring and early summer were too dry and cool for a good growth of vegetation. The hay crop was much below the average, but the grain crop was fair. On the hills the crops were the best for many years.

Except at Mara and Carlin we saw no damage done by forest fires this season. On the whole the losses from fires must be much smaller than for many years. This is, no doubt, mostly due to the watchfulness of the fire wardens, but the new provincial regulations, by which a farmer must get a permit before setting out fire for clearing land, should also be a help.



## APPENDIX NO. 37.

## EXTRACTS FROM THE REPORT OF A. SAINT CYR, D.L.S.

SURVEY OF THE SIXTEENTH BASE LINE BETWEEN THE THIRD AND FOURTH MERIDIANS AND  
PART OF THE THIRD MERIDIAN.

On December 17 I left Prince Albert and travelling by the Montreal lake road reached Indian reserve No. 106 A. We camped near the northeast corner of township 52, range 1, where I was to commence the survey of the third meridian.

The survey of the line proved to be a trying piece of work owing to the long periods of intense cold which prevailed during the winter and the deep snow which necessitated the daily use of snow-shoes by every member of the party who had to be on the line. During the winter months the snow seldom packs sufficiently hard to carry any great weight and even with large snow-shoes one had to flounder knee-deep through it, a most arduous and heating work for those who had to explore a country often very hilly or covered with high deadfall and where dense and tall undergrowth continually impedes progress.

Another drawback was that oftentimes work on the line had to be stopped and all hands set at cutting roads through miles of fallen timber, as all the streams intersected by the third meridian flow generally at right angles to it and the ice on such streams could not be taken advantage of in moving the camp or supplies forward.

## DESCRIPTION OF THE COUNTRY ALONG THE THIRD MERIDIAN.

From the northeast corner of township 52 the third meridian crosses the valley of Little Red river and ascends to the high lands bounding its valley to the east. These lands extend northerly to the valley of Angling creek, an easterly tributary of Little Red river. In its widest part, in township 52, the valley of this river does not exceed two miles in width and the bottom lands, found only along its right bank, are included in parts of sections 2, 3, 10 and 12, the strip adjacent to the river having the best soil. Along the foot of the high pine ridges, which also limit the valley to the west, the prairie land has a drier and more shallow soil, overlying a subsoil of gravel. A few shanties, now abandoned, would indicate that this land was once occupied by squatters, who, however, appear to have done no cultivation beyond raising vegetables.

North of the valley of Angling creek are some high hills wooded with jackpine and a few spruce, and included in the same timber berth which covers nearly all of township 54. Then the line enters a low country with many lakes, the largest ones being called Whitesand, Trapper, and Beartrap. They drain into Angling lake by a small stream which meanders through large hay meadows extending southwards to the north shore of the lake. As the banks of this stream are very low it is probable that portions of the lands near the creek are flooded at certain seasons.

North of Whitesand lake, ridges covered with jackpine, or swampy lands with spruce and tamarack, continually recur through township 56, which mark the northern limit of timber berth No. 245, located east of Little Red river. This section of country has been lumbered over extensively for so many years that the merchantable timber must be either getting scarce or more difficult of access as no logs were cut on these lands during the last winter. Great activity, however, prevailed in the camps west of Little Red river, which at that time were located near Sandy lake, and on its outlet, McKenzie creek.



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Townships 54 and 55 are covered with a better growth of poplar trees which are, however, found only in groves separated by extensive tracts of burnt-over country where the new growth is stunted. In approaching Montreal lake merchantable spruce timber from ten to twenty-four inches in diameter is found near its south end.

Continuing northwards from the fifteenth base line, the third meridian passes through low and swampy lands intersected by gravel and sandy ridges. The outlets from Waskesiu and Crean lakes are the two principal streams which drain these wet lands into Montreal lake.

A strip of good spruce from ten to twenty-four inches in diameter begins in section 24, township 60, and extends one mile north of the sixteenth base line and three miles east of the third meridian whence smaller timber covers the land as far as the west shore of Montreal lake. Patches of good timber are found at intervals in ranges 1 and 2. A narrow belt of heavy spruce is also found along a chain of lakes occupying a valley which crosses the middle of township 56 from west to east. This is all that is left of a good block of timber which at one time grew where the land is now covered with high deadfall.

The trees most commonly seen along the west side of Montreal lake are poplar, birch and cottonwood. Pine also grows on the high lands which rises from its shores and west of which is the low and boggy country above referred to.

Much of the upland in the vicinity of Crean, Waskesiu and Montreal lakes might be made productive. The vegetation such as I have noticed at many places consists of pea-vine and grasses indicative of a good soil, and I do not doubt that the ordinary cereals and all kinds of vegetables could be raised after the land has been cleared of the fallen trees and thick scrub which cover it.

This part of the country is easily reached from Prince Albert by the Montreal lake road, which though hilly is in fair condition for travel at all seasons.

Except Montreal lake, all the other large lakes are well stocked with large trout, whitefish, pike and pickerel and during the winter months large quantities are caught. I bought several boxes of fish for the use of my camp and was surprised at the great size of the trout packed therein.

Valuable timber, not included in the timber berths under lease at the present time, is still found growing in limited quantities and in sparsely distributed areas separated by large tracts of country which were overrun by fires years ago and where the trees of the second growth are still too small to be of any commercial value.

The merchantable timber consists chiefly of spruce growing on lands more or less swampy, such as adjoins lakes or streams with low banks.

Pine of a size sufficiently large to make it valuable is found in groves on the highest hills. It grows straight and limbs are found only near the top of the tree. As this kind of pine keeps its size well it could be used for railroad ties. It was first noticed in township 59, on the hills along the valley of Crean creek.

The other kind of pine is very common on all minor elevations. It has a stunted appearance and carries large and long limbs which drop almost to the ground. In size it runs up to twelve or fifteen inches.

Birch appears to decay after it has reached a diameter of six inches, very few of a larger size having been seen that were not already partly rotten. Tamarack up to eight inches were seen also, but they are generally hollow or unsound in the centre.

Poplar which have reached a diameter of twelve inches are often affected in the same manner. Pine and spruce appear to be the only trees which grow sound to the largest size noted, thirty inches.

The proportion of these different kinds of trees, distributed over the country traversed by the third meridian, and of size suitable for pulpwood, is as follows: Poplar, 50 per cent; spruce and jackpine, 40 per cent; and tamarack, birch and balsam, 10 per cent. Admitting that no trees smaller than four inch is to be cut, the esti-



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mated quantities of the above timber that could be utilized as pulpwood in the district adjacent to the third meridian is about two million cords.

Limited water-power could be developed on the following streams which intersect this meridian; Waskesiu creek in township 58 and Crean creek in township 59. These creeks flow into Montreal lake.

## DESCRIPTION OF THE COUNTRY ADJOINING THE SIXTEENTH BASE LINE.

The survey of the sixteenth base line was commenced in the latter part of March, 1909. From the northeast corner of township 60, this line passes through eighteen miles of country several times overrun by fires, which have in many spots cleared the land of fallen timber. This land is, however, generally stony. Numerous lakes are seen in every direction and they all drain into Montreal lake.

After crossing the height of land in range 4, good soil was noticed in the vicinity of Lavallee lake, where Louis Lavallee, a half-breed, has resided for many years.

This lake is over six miles long and two miles wide, occupies the central portion of township 61, and its north end is surrounded by hay meadows. A small section of the other end of Lavallee lake lies in township 60, where a large creek which comes from the southeast flows in. The outlet of this lake starts a few chains south of the point where the base line intersects the west shore. At first it flows swiftly over a stony bottom, but after crossing the line, two miles farther, the current slackens considerably and the stream then winds across the hay marshes between Lavallee lake and Paquin lake.

A short distance north and south of the line the land is high, rolling and timbered with mixed woods of small poplar and jackpine.

North of Lavallee lake the country is more level and lightly wooded with second-growth poplar. The soil is good. In ranges 6 and 7, extensive swamps and bogs and the accompanying pine ridges reappear around Lawrence lake which discharges into DeLaronde lake but good and fairly level land is met again four miles east of DeLaronde lake, in range 8. A good growth of poplar covers the land on each side of this lake which the line crosses near the north end. During the summer I had an opportunity to visit the district at the south end of the lake when in search of some of my supplies which had been left by the freighters at a squatter's house as the only place where they could be safely cached. On that trip I travelled by canoe to the southern end of DeLaronde lake and thence overland to Cowan lake. By this portage the distance between the two lakes is about five miles. There are two small lakes and the north end of Ladder lake to cross before reaching Cowan lake. The land between DeLaronde lake and Cowan lake is good and level with some prairie and hay meadows. The outlet of Stony lake issues from the west side; it is increased in volume a few miles farther by the outlet of lac Voisin, and flows westward to the south end of Taggart lake, located in townships 59 and 60, range 18, where Taggart creek crosses the line before it joins Cowan river flowing out of Cowan lake. This lake is a long narrow body of water which extends southeasterly beyond the fifteenth base line.

Last fall a steam sawmill was erected near the point where a large stream enters this lake. In this vicinity are large timber berths where lumbering operations were carried on during the winter. The lumber company has secured several valuable timber limits in the district and in proximity to their mill sites, thus avoiding the difficulties met by the pioneer lumber companies who had to haul the marketable products of their limits over long distances to their nearest market, Prince Albert.

The Canadian Northern Railway company is also building their line in that direction and last fall rails had been laid as far as Shellbrook settlement. Work on the section of this road which is graded for a considerable distance beyond the settlement will be resumed in the spring.



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Large hay meadows exist at the north end of Cowan lake which is connected with Green lake by a road principally used by freighters during the winter. Although the land adjoining these large lakes is at present generally wooded, there is some which it would be neither difficult nor expensive to clear. Good hay is plentiful everywhere and would provide fodder for numbers of cattle. The fact that a railway company is pushing their line through it ahead of the settlements should be sufficient inducement to homesteaders to take up this land. It lies about sixty miles north of Shellbrook district where last year the farmers raised phenomenal crops, principally oats, although according to the oldest settlers the spring season was the most backward experienced for thirty years. During the winter months employment at remunerative prices could be secured by the newcomers, either from the lumber companies, who always hire a large number of men, or by freighting merchandise for the two fur trading companies at Green lake, which still remains the gateway to the northern fur trade and where immense quantities of supplies of all descriptions have to be brought for distribution to their distant outposts.

Green lake settlement grouped around one of the oldest and most important trading posts established by the Hudson's Bay company in this country, was reached on August 23. It is well known that the cultivation of the soil was begun here very many years ago and that barley, oats, potatoes and all ordinary vegetables have since been successfully grown. Father Teston, O.M.I., who is in charge of the Roman Catholic mission, and is also the postmaster at Green Lake, showed me through his gardens, where besides vegetables, he cultivates several kinds of small fruits, such as currants, &c.

The settlement is peopled with half-breeds, who all own horses and cattle, it being easy to provide fodder by cutting wild hay, of which there is an abundance along Beaver river, and especially at a place called 'The Hill,' at the confluence of Meadow river and Beaver river.

West of Green Lake, the sixteenth base line enters a densely wooded country where some good spruce from ten to twenty-four inches grows and is included in two large timber berths under lease. This forest extends fully through two and a half ranges. Then comes the more lightly wooded country drained by Meadow river and its tributaries. Meadow river flows out of Meadow lake, north of which I saw good agricultural land fit for immediate settlement, it being largely in prairie land with occasional poplar groves. The more open land is, however, within an Indian reserve, and is not cultivated. Fresh water and quantities of hay growing on the upland and in the hay meadows is found throughout. The agricultural land around Meadow lake would cover townships 59, ranges 17 and 18 and the southern half of township 60, range 17.

At Meadow Lake there is a Roman Catholic mission and a trading post kept by the agent of the Hudson's Bay Company.

This settlement is connected with Battleford by a wagon road, but it is a circuitous route passing by Brightsand lake and Turtle lake. A new road nearly completed is being opened from Battleford. It follows the line separating ranges 16 and 17, and will be much shorter than the old one. There exist many large hay marshes and lakes through the northern half of township 60, range 17, and between these are belts of merchantable spruce timber. There are also some large tracts well wooded with poplar from six to thirteen inches in diameter. More merchantable timber is found at about two miles north of the base line and extends as far as Beaver river.

In range 19 the line crosses Makwa river near its confluence with Beaver river. The general course of Makwa river is southeast; its principal affluents are Horsehead creek and Rabbit creek, which rise south of the fifteenth base. A good road which I open to facilitate the transport of my supplies now connects Meadow Lake settlement with the Beaver river valley at the point where Makwa river and Beaver river meet.

Makwa river averages one chain and a half in width. Its lower reach is a succession of cascades and rapids with intervals of slack water. As the fall of this stream



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is considerable, water-power could be developed along its course. Dams could be easily and cheaply built at suitable points as the materials required for such construction is close at hand.

I explored the country on both sides of Beaver river from its junction with Makwa river westward to the fourth meridian in order to ascertain the quality of the soil and the timber growing thereon. I have also made a track survey of the river which is accurately mapped on the sketch map accompanying this report. The width of this river varies very much. In some places it is nearly four chains wide, whilst at others it is hardly half that distance. The current averages about three miles an hour. There are very few islands and no rapids, the 'riffles' noted at the time of survey (December, January and February) would not be noticeable in the ordinary stage of water during the summer. The elevation of the river banks varies from ten to twenty feet and the adjacent strip of bottom lands extending back to the foot of the high hills which rise from either side of the valley proper, varies greatly in width. In places it is three-quarters of a mile wide, at others, where the hills from opposite sides approach the river, it is considerably less. On some of these bottom lands wild hay grows, but such lands are liable to be flooded at high water. Where the banks rise to eighteen or twenty feet the land is wooded, sometimes with spruce, but more frequently with poplar, birch and cottonwood. In a distance of seventy-five miles along the sixteenth base line, between the fourth meridian and the mouth of Makwa river, Beaver river receives only two creeks from the north. They are Wild-carrot creek, which flows across township 61, range 21, and another unnamed stream in township 61, range 25, East of this last creek there is a winter trail used by the Indians travelling from Onion Lake settlement to Big Island lake. Open country along the left bank of Beaver river begins at range 25 and extends westerly through the next range.

Between Beaver river and the sixteenth base line from range 24 to range 26, the land is covered with scrub and a second growth of poplar, birch and a few spruce and jackpine. However, in the southwest quarter of township 60, range 25, and the east half of range 26, there is a considerable area of partly open and prairie land with good soil where quantities of upland hay could be procured, and where good water is found in numerous small streams. The land would be suitable for agriculture and stock raising. It lies about thirty-six miles north of Onion Lake settlement, with which it is connected by a good wagon road which passes by the trading post on Ministikwan lake.

There are at present several families of Cree Indians living along the north and west shores of this lake where the country is rolling and fairly open, and hay is plentiful. This accounts for the residence in this locality of the Indians who own horses and cattle, while those do not at other parts of the lake shore which is surrounded by thickly wooded hills, the highest ones rising a short distance east of the lake. These hills gradually slope down towards the south end of the lake, where a small creek flows in.

The stream which connects Ministikwan lake to Makwa lake is about twenty-five feet wide and at one mile and a half east of the first mentioned lake runs between hills with very steep slopes. Beyond this the country is, however, tolerably level, and the land is covered with scrub and sparsely timbered with a few jackpine and poplar not exceeding six inches. There is a wagon road between Onion lake and Ministikwan lake.

Eleven miles east of Ministikwan lake is Makwa lake, where Big Bear and his band of braves had entrenched themselves in 1885 and where he met General Middleton's troops. As a result several Indian graves to-day mark the spot where the encounter took place.

Makwa lake is of a very irregular shape and divided into two unequal expanses of water by a large island well wooded over its north half with spruce trees up to fifteen inches. The other half is covered with smaller trees such as poplar and birch. The narrow passage between the two lakes is east of this island where some fisherman



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has built a house. At very low water this island appears to join the mainland north by marshes where wild hay grows and which are fringed with thick willow. These willow lands extend northward for a considerable distance.

High hills which in places slope steeply down to the water's edge rise around Makwa lake except a short distance along its north shore where the country is flat and heavily timbered with spruce up to thirteen inches. Through these flats runs the outlet of Ministikwan lake, before it discharges into Makwa lake.

Merchantable timber consisting of spruce eight to twelve inches is found in small quantities at two or three other spots near the lake shores, the most common trees found in this part of the country being poplar and birch rarely exceeding six inches and of stunted growth.

The tract of country between the two lakes above mentioned would cover ranges 23 and 24, along the fifteenth correction line and may be thus described. Travelling eastward from the northeast end of Ministikwan lake, the country is rolling or undulating, and the land, which is covered with poplar groves and scrub-willow, could be easily cleared. Here are also many patches of prairie land. Good water would be found in the lakes which dot this section, and in the creeks. Beyond Half Way creek, so called because it is midway between the two lakes, the country gets very hilly and could be utilized only for stock raising. At present it is sparsely wooded with poplar. A narrow belt of jackpine up to fifteen inches crosses these hills from north to south. A strip of spruce trees was also noticed along the east side of the valley of Half Way creek. The rest of the timber is small and of no commercial value.

There are a few hay meadows along Makwa lake, notably at the southern extremity of the smaller lake and also along the north shore, opposite the 'narrows' and the large wooded island above referred to. Many shanties have been built along its shores by fishermen.

Like all the larger lakes in these parts Makwa and Ministikwan lakes abound with whitefish and another kind which resembles it, but is smaller and which the natives call 'Tuladi.' In Beaver river pike is caught all the year round; in the winter it should be looked for only in places where there are eddies and deep water. Sure indications of the proper spots are given by the otters air-holes along the banks of this stream.

Large game is plentiful, and deer or moose meat fresh or dried according to the season forms the principal food of the Indians and those who travel through the country. Of the furs collected by the fur trading companies, the muskrat skin is still the most commonly exchanged for such commodities as sugar, tea, tobacco and flour. Partridges and prairie-chickens are still quite common.

Between the third and fourth meridians the territory adjacent to the sixteenth base line comprises twelve miles on each side, or 3,816 square miles. Deduct two-thirds of this area for streams, lakes, swamps and boggy lands and the large tracts of burned over country at present covered with sapling and willow and the reservation of the merchantable timber included in leased berths, and there remains 1,300 square miles or 832,000 acres of forested land where poplar and balm of Gilead represent sixty per cent; jackpine and spruce thirty per cent and birch and tamarack ten per cent.

Allowing an average cut of fifteen cords per acre, this district will supply about 12,500,000 cords of different kinds of wood suitable for the pulp industry.

Along the sixteenth base line water-power could be developed on Meadow river in township 59, range 17, and on Makwa river in township 60, range 19.



## APPENDIX No. 38.

## EXTRACTS FROM THE REPORT OF J. B. SAINT CYR, D.L.S.

## SURVEYS IN THE PEACE RIVER DISTRICT.

I established my camp on the south side of Peace river, six miles above Dunvegan, at a place commonly called 'the island,' and on April 28, early in the morning, I went with my men to the northwest corner of township 80, range 5, west of the sixth meridian. I first moved the corner post 16.70 chains north of its original position and started the east boundary of township 80, range 6. I destroyed the monument on the primitive base and established a new one 16.70 chains north. Two days after I crossed and chained the line on the ice. I certainly arrived in good time at Dunvegan, as to perform the same work after the breaking up of the ice would have been a very hard task. I produced the said line as far south as possible and surveyed three miles of the north boundary of township 79, range 5, from the same camp. In the meantime the ice broke away on the river, so I built a raft and a few days after when the river was safe enough we floated down to Dunvegan with our baggage. We landed on the south side of the river as there was no means of crossing at the time, the ferry being only under construction. The following day I camped on the hill to complete the north boundary of township 79, range 5, west of the sixth meridian. My next camp was established near the southwest branch of Ksituan river, north of Spirit River settlement. From that point I completed the east boundary of township 79, range 6. The country crossed by that line is cut by deep and wide ravines, thickly timbered, and in the bottom of which regular torrents were flowing. On May 27 I went farther south to run the east boundaries of townships 77 and 78, range 6, which was completed on June 17. The subdivision of township 77 and 78, range 5, which was commenced in June, ended on September 8.

Egg lake trail with Dunvegan and Grand prairie wagon road cross those townships. I have surveyed river lots along the above mentioned streams in both townships.

On September 9 I began the subdivision of township 79, range 5, which was completed on October 16. Ksituan river and Rat creek, tributaries of Peace river, and Spirit river, flowing into Brule river, drain that township. Dunvegan and Spirit river wagon road crosses that country in a southwesterly direction. Sawmills and dams can be erected on different points along Ksituan river, as the general fall of the water in that stream and its tributaries varies from forty to fifty feet to the mile. The width of the river is about one hundred and forty feet with a depth of from six to eight feet in the spring. The water is somewhat muddy when the river is high but it is clear and fresh after that. Hills ranging from four to six hundred feet in height border these streams. I did not lay out any river lots there owing to the difficulty for the settlers living on the table-land to get to the river. It would be advisable to reserve the northern portion of township 79 as a timber berth.

While completing the subdivision and the mounding of that township, I explored the country from the twenty-first base to the twentieth correction line and between ranges six and seven, west of the sixth meridian. Heavy windfall is met with everywhere and the country is cut by deep ravines. There is no pack trail or road of any kind through the country and it would require a very long time to open a road or even a pack trail there. On October 16 I established camp in township 77, range 6,



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and surveyed the east boundary of townships 77 and 78. The country adjoining the line is covered with thick bush and large tracts of windfall. On October 29, I started the subdivision in township 77, range 6, and completed it on November 12. The climate is better than along Spirit river. The frost comes generally two or three weeks later in the fall than in the adjoining townships.

The subdivision of sections 1 to 24 in township 78, range 6, was completed on November 29. Spirit river flowing from west to east crosses sections 6, 5, 4 and 3. Spirit river people with the residents of Pouce Coupe prairie intend to open a wagon road between the two places very soon. The location of the road is said to follow a long ridge south of the existing pack trail.

I next located permanent access of the road to the water on both sides of the river at Dunvegan. Changes have been made also to the front road on the north side of the river. I connected the settlement south of Peace river with the nearest subdivision posts north and south of the river.

I then went to township 82, range 24, west of the fifth meridian to destroy some monuments made there last year, north of a road allowance along the north boundary of Indian reserve No. 151. I also established a regular monument in place of the witness trench on the northerly limit of the road allowance along the northerly boundary of Indian reserve No. 151 E.

On December 8 I arrived at Peace River Crossing settlement and connected the surveys of Shaftsbury settlement made by Mr. H. S. Holcroft, D.L.S., in 1908, with those of the addition to Peace River Crossing made by me in the Spring of the same year. The positions of the cable, towers and anchorage on both sides of the river were determined by me. I have also extended the survey of the road allowances to have the towers and anchorage on public lands. At Peace River Crossing as well as at Dunvegan, some changes will be made to both cable ferries for the following reason. In Dunvegan the ferry gives a poor service and the tower on the south side of the river has to be shifted farther east. While at Peace River Crossing it is impossible to make a good grade on the east side of the river and furthermore it is a bad landing place. It is intended to make the above mentioned changes next summer and I have located enough land in both settlements for that purpose.



## APPENDIX No. 39.

## EXTRACTS FROM THE REPORT OF B. J. SAUNDERS, D.L.S.

## SURVEY OF PART OF THE NINTH AND TENTH BASE LINES WEST OF THE FIFTH MERIDIAN.

Upon completing the organization of my party at Innisfail, I moved westerly from that town along the road leading to Raven, Stauffer and Rocky Mountain House, leaving this road about ten miles west of Stauffer in order to cross Clearwater river by means of the new steel bridge recently erected by the Alberta government over that stream in township 37, range 6, west of the fifth meridian. From this point to the northeast corner of township 36, range 8, we had to cut and make our road the greater part of the way, owing to the soft and wet condition of such roads as the settlers had been using, rendering them impassable for loaded teams.

The survey of the tenth base was commenced on June 29 by reopening and taking up the line to the east of range 8 as preparatory work, and after duly observing for time and azimuth, the survey was steadily carried on up to September 9, by which time the line was completed through ranges 8, 9, 10 and 11, and as far as I considered it practicable to establish it owing to the mountainous nature of the country.

Throughout ranges 8 and 9, and nearly all of range 10, the country traversed by this line is, generally speaking, rolling and hilly, while the west side of range 10 and all of 11 is mountainous, the outer range of the Rocky mountains being crossed in section 31, township 36, range 10.

The whole country has been more or less burned over within the last twenty-five or thirty-five years, with the result that the timber is rather small with the exception of here and there, in small patches, fairly large spruce and pitch-pine.

The soil is of a sandy nature and inclined to be stony. There is practically no grazing land, except along the creeks where the natural grasses grow with most remarkable luxuriance, some six feet high being noted along one of the tributaries of Prairie creek. The drainage of the country is to Prairie creek, a number of tributaries of which are crossed by the line.

In township 37, range 8, to the north of the line, a number of settlers have located on Prairie Creek, where a considerable area of good hay land is found.

No economic minerals were met with during the progress of the survey. Gold 'colours' were obtained from panning the gravel in Prairie creek, in range 8, and outcrops of lignite were noted in township 36, range 11, about two miles south of the line on a small stream leading to Prairie creek. There are sulphur springs to the north of the line in the same range, the water of which is cold.

I do not consider the land to the south of this line desirable for settlement at the present time, but as already mentioned a number of settlers have located to the north on Prairie creek.

Having completed the tenth base as far as range 12, on September 9, on the following day we started for the ninth base line at the northeast corner of township 32, range 8, west of the fifth meridian. This line was established through ranges 8, 9 and 10, west of the fifth meridian, well into the mountains and within a mile or two of the snow-capped peaks.

The whole of this line lies within the Rocky Mountains park, and in consequence no settlers have located west of range 7, the line between ranges 7 and 8 being the east boundary of the park.



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The country along this line throughout the three ranges surveyed by me is practically all mountainous, range 11 being particularly rugged. At the ninth base and in its vicinity the eastern face of the mountains is not so well defined as at the tenth base and farther to the north. The country gradually changes from hilly to mountainous.

The country traversed by this line is very well timbered with spruce and pitch-pine of good quality and size. There are some open patches of land in the valleys, but they are all more or less inclined to be wet and of a muskeg nature. The soil is chiefly of a sandy or gravelly quality.

The line crosses James river, a tributary of Red Deer river, on the north boundary of section 34, range 9. It is a mountain stream with an average width of about forty feet, flowing between well-defined banks with a general northeasterly course. This is the only stream of importance, although the whole country is very well watered with numerous small streams from the mountain sides.

Lines of levels were carried along both base lines, the datum for the tenth base being determined by barometric readings taken at the point of commencement and compared with readings taken on the Canadian Pacific railway track at Innisfail, while the levels on the ninth base depend on angles of depression taken at two points on the line, upon the grain elevator at Olds station on the Calgary and Edmonton branch of the Canadian Pacific railway.

During the season the usual foothill weather prevailed with considerable cloudy weather, and heavy thunder showers in June and July. September and October were very fine months, but before the middle of November it was extremely cold with the thermometer down to 20° below zero.

The country on both sides of each base was pretty well examined by the explorer attached to the party and the results of his work are shown on the sketch plan already forwarded to your office.

Very little game was observed during the summer and autumn, and unless measures are soon taken to stop the annual depredations of the Indians from the reservations to the south, there will be no game left in the country.



## APPENDIX No. 40.

## EXTRACTS FROM THE REPORT OF W. A. SCOTT, D.L.S.

## SURVEYS IN SOUTHERN ALBERTA.

The season was unusually late and wet, and the roads were in bad condition. For this reason we were forced to wait until May 25, before starting out for township 13, range 1, west of the fifth meridian. The shortest route to reach this township is by going almost straight north to the west side of Porcupine hills, but at this time of the year it was considered advisable to go by the east side, and the wisdom of this move was apparent when the party returned south in July by the shorter route. The move from Pincher creek to the work occupied five days and the country passed through was that which, at one time, was the undisputed range of the cattle-men, but which, during the past few years, has been rapidly taken up as farm lands. Many steam plow outfits were seen and the country looked good and the people prosperous. The cattle ranches are fast disappearing, but there are still a few large ranches in existence.

While in the township a trip was taken to Calgary via Nanton to purchase a pack outfit for use in the mountains. The road to Nanton follows the valley of Willow creek as far as Willows post-office, crossing the creek many times, which makes it impassable for a month or six weeks in the spring. A road could be easily built on either side of Willow creek cutting out all crossings and making a good road the year round. There is at present a trail leaving Willow creek at the junction of the north and south forks, which goes in a northwesterly direction to Nanton and is much shorter than the one generally used, but it is very hilly and it would not be advisable to build a road following this general direction.

After completing the subdivision necessary in this part, the party moved to township 13, range 3, and here experienced the first mountain work.

We next moved south to commence work in township 9, range 3, passing through the eastern parts of townships 12 and 11, range 2. Only part of township 11 is subdivided, but both townships appear to be good farming land if they are not touched by summer frosts. The small mountain streams in their rapid descent afford an excellent opportunity to irrigate the land, and several small irrigation ditches were seen.

During the summer a preliminary railroad survey was made up this valley to investigate the possibility of connecting Cowley with Calgary by a line through the hills. The location, I was told, was not very satisfactory because of the heavy grades which would be necessary. A survey was made several years ago which followed up the valley of Oldman river and over the divide to Highwood river. This, I believe, would be a better location, as there is only one summit and the road would give access to the great area of coal lands in the vicinity of Oldman river. A part of this road will no doubt be constructed in the near future.

An alternative and much shorter route to reach the coal areas north of the Canadian Pacific railway is by going north up the valley of Gold creek and down the valley of Daisy creek to Oldman river. There is at present a railroad from Frank to Lille. At the divide a tunnel would have to be driven through the hill.

On September 11, all the work in this part was completed and the next work was the production of the third base line across range 4. To reach this work I found



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it necessary to cut a pack trail through a most difficult country lying between the 'Gap' and the town of Coleman.

North of Coleman the country is of a most mountainous character. The third base line was produced across range 4 and the end is a quarter of a mile up the lower slope of Crowsnest mountain. The general direction of the valleys is north and south coinciding with the strike of the rocks. The rocks may be divided into three main divisions, viz: The Devono-Carboniferous, the Middle and Lower Cretaceous, and the Upper Cretaceous. The Devono-Carboniferous rocks consist principally of limestone. The important division from an economic standpoint is the second division or Middle and Lower Cretaceous. This division consists of, in ascending order, (1) Grey and black shales; (2) Productive coal measures; (3) Hard cherty conglomerate. The dip is towards the west and varies from  $30^{\circ}$  to  $60^{\circ}$ . The outcrop generally seen along the tops of the hills is conglomerate.

The most noticeable feature of the weather in the mountains is its variety and the suddenness with which changes occur. Work may be commenced in the morning in the finest of weather and during the day it may change to snow, rain, dense fog and very likely to fine weather again. At the same time the weather only a few miles distant may be altogether different. I also noticed that the stormy fall weather occurred almost a month earlier in the proximity of Crowsnest pass than it did at the 'Gap,' and just beyond Livingstone range still later.

Another feature which I could not help noticing was the large flow of water in the creeks for the small area of watershed. The dimensions of a creek may not be any greater for a certain area of watershed in the mountains than on the flats, but the current is so rapid that at least twice the flow would be recorded if such a record were taken.

On leaving the mountain work I moved to township 13, range 2, by way of the 'Gap,' southeast to the Walrond ranch and then straight north to township 13. The weather was altogether different here, almost no snow, but fine, cold weather. I did the work here which I was instructed to do, and then completed the subdivision as far as possible. I then proceeded to run the east boundary of township 12, range 3, but after getting this line cut two miles, found that it was running into the hills and that I would be unable to produce it any farther at this time of the year.



## APPENDIX No. 41.

## EXTRACTS FROM THE REPORT OF H. W. SELBY, D.L.S.

## SURVEYS IN NORTHERN ALBERTA.

My first work was to run the east outline of township 72, range 2, and the north outline of township 71, range 1, west of the fifth meridian, to subdivide such portions of these townships as were occupied by squatters and to traverse Lesser Slave and Athabaska rivers through them. Both of these rivers have been accurately and fully described in previous reports, and it would seem unnecessary to say anything further about them. It may not be out of place for me to make a few remarks upon their changing conditions. Lesser Slave river, which is the outlet of Lesser Slave lake in section 7, township 73, range 5, flows in an easterly direction to its confluence with Athabaska river in section 22, township 71, range 1. The fall from the lake to the Athabaska, a direct distance of about thirty miles, is over one hundred feet. Seventy-five feet of this fall occurs within the easterly twelve miles, that is to say, from the top of the rapids to the Athabaska. Into the upper part of Lesser Slave river fall three streams, each about seventy-five feet wide, Saulteux, Otauwau and Prairie rivers, and Eating creek about fifty feet wide. Frequent rain-storms, in addition to the large volume of water coming into the lake, causes Lesser Slave river to rise several feet. At these times large quantities of sediment, trees, logs and brush are carried from the lake, the rivers and creeks into Lesser Slave river, and thence down the Athabaska. This causes much erosion of the banks of the rivers. The building of wing dams on the easterly part of the river and the excavation of a channel which is being dredged is freeing a large quantity of sediment. All these things combined make a wider channel for the same volume of water, and at the same time cause the formation of bars in the Athabaska, resulting in a shorter period for navigation. Dredging portions of the upper part of Lesser Slave river would be a great benefit not only for the purposes of navigation, but for the reclaiming of large swamps which lie north and south of the upper part of the river, and which are now about on a level with the surface of the water and must remain wet swamp in which timber will not grow to any size, nor grass for hay or pasture. The banks of this part of the river are seldom high enough to keep the water within the channel at times of freshets. The banks are from five to ten feet high, but the land rises from the banks in benches to a height of from one to six hundred feet above the level of the rivers through ranges 1 and 2, west of the fifth meridian. On the tableland, except where drained by rivers, large areas of wet land are found where the timber is too small to be of any commercial value. Along the rivers the land is dry and the soil good.

Some excitement was caused by the discovery of placer gold in a gravel ridge on section 23, township 71, range 1, but the extent and value has not been ascertained. Mirror Landing is a telegraph station on section 22, township 71, range 1. There is also a store, a stopping place for travellers by the steamer, and a warehouse belonging to the transportation company. The Government telegraph line from Edmonton has been completed to a point six miles west of Mirror Landing. This is a great convenience, and it is hoped the line will be continued to the west end of Lesser Slave lake next season. Saulteux landing on section 25, township 72, range 3, is the point of departure of the steamer up to Lesser Slave lake. Here is a warehouse and stopping place.



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On June 7, having surveyed all the land on Lesser Slave river which is occupied, or likely to be for some years, I left for my next work west of Winagami lake.

There is a road shown on the Department maps from the the Peace river road near Lesser Slake lake to Smoky river, but this was only for winter travel. No wagons had ever been taken through from Winagami lake to Smoky river. I widened, corduroyed and changed the position of the road around large hay meadows, so that now there is a fairly good wagon road through the townships surveyed.

I subdivided townships 77, ranges 20 and 21, township 78, range 21, and portions of townships 77 and 78, range 22, and ran the outlines, and established the correction line across range 21 by running the east outlines of ranges 21 and 22. There is scarcely any part of these townships composed of waste or useless land. The land is high and gently undulating, with good drainage. A large portion of it has been burnt over, the last time in 1904, only poplar bluffs and willow bunches being left. Since then willow brush and small poplar have sprung up over portions of it. What appears to be at the present time wet and swampy is made so because there is no free outlet for the melted snow and rainfall, except by gravitation over the surface to the two creeks forming the drainage outlets to this large tract of as fine land as can be found within the unsurveyed portions of the Dominion lands.

The country through ranges 15 and 16 shows much improvement, numerous farm buildings being erected and many fields of grain were harvested this year as far west as section 16, township 76, range 16. Upon this latter fine crops of wheat and oats were seen growing.

The main road passes through the central portion of range 17, where there is a prairie of probably one hundred acres in extent. It is from a half to three-quarters of a mile east of South Heart river and is occupied by five lodges of Indians from the Sturgeon Lake band. They have built several log stables and houses, have a number of cattle and horses and have made about one hundred loads of hay on the south shore of Winagami lake, but they do very little breaking, except for a few potatoes. This is a very fine piece of land and if occupied by settlers, much of the lightly timbered land around it could be easily cleared and would make several good farms.

About two miles south of the twentieth base line on the southwesterly side of Winagami lake there lives, with his family, James Prudens, an English-speaking half-breed, who has houses and barns, several head of horses and cattle, all kinds of implements and a fenced clearing for garden purposes. He puts up about one hundred loads of hay from the meadow land situated on the south side of the lake.

About two miles north of the northwesterly arm of Winagami lake there lies a body of water called by the natives 'Round lake.' It is not shown on any map that I have seen. The northeast corner of section 36, township 77, range 20, touches the southerly shore of this lake which appears to be about three-quarters of the size of Winagami lake.

There are three creeks, Peavine, flowing westerly through townships 77, ranges 20 and 21, 'Round lake' creek, flowing from 'Round lake' into section 36, township 77, range 21, and entering the Peavine in section 16, and Hunting creek rising in section 4, township 78, range 21, and flowing northwesterly through section 23, township 78, range 22, into Smoky river.

Reed creek is another small water-course flowing westerly and southwesterly from Reed lake in the northeast part of township 79, range 21, and crossing the north boundary of section 36, township 78, range 22, enters Hunting creek about a mile and a half west of section 26, township 78, range 22. These creeks having their origin in large depressions into which the melted snow and rainfall finds its way by gravitation, are not permanent, the flow of water having practically ceased in August, but pools of water were found in them all during the time the survey was being made. The water is invariably good with scarcely any alkaline taste.

Explorations for railway lines have shown that the most feasible line between Edmonton and Peace river giving an easy grade and with the least mileage for bridg-



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ing, would pass through these lands, crossing Smoky river at the head of navigation, where the banks are stationary. Above this point the banks are composed of a succession of land slides, and the country south of Little Smoky river is cut up with numerous creeks within deep coulées, all more or less heavily timbered.

A noticeable feature of the weather was that very few showers of rain fell during daytime; rain being more frequent at night and gradually clearing with the rise and heat of the sun. The snow which fell early in October did not remain long, but on November 5 it came to stay. On November 8 the temperature went down to 15° below, and on the 12th to 20° below zero.

It might be surmised from the lateness of the spring and the cool summer, that the crops would have been a failure, but such was not the case. Wheat, barley and oats were harvested in perfect condition, and potatoes planted in June were a fine crop. The ice did not entirely leave Lesser Slave lake until June 5, and the snow was from eighteen to twenty-four inches deep in the woods in April, yet strawberries were picked on July 5, and great quantities of other varieties of berries were found ripe and not frosted on September 6.

On November 3, I moved to Lesser Slave river, where there was some traversing to be done near Saulteux landing. After the traverse was made, I began the survey of a timber berth on Athabaska river, which I finished on November 26.



## APPENDIX No. 42.

## EXTRACTS FROM THE REPORT OF J. N. WALLACE, D.L.S.

## SURVEY OF PART OF THE FOURTH MERIDIAN.

We reached Lloydminster early in the morning of March 22 and on that day travelled thirty-five miles to Onion Lake by sleigh. Next day we left there and reached the Hudson Bay company's post at Cold lake after two days' journey; on the fourth day after leaving Edmonton the outfit was moved about twenty miles northeasterly from this post, and we camped on the fourth meridian where work was to be begun.

There is a fairly large settlement at Onion Lake, an English and a Roman Catholic mission, post-office, telegraph office and Indian schools; and the Hudson's Bay company have a well-supplied store. The district appears to be a very good one and is rapidly filling up with settlers.

From Onion lake to Cold lake the road passes around the south and west of Frog lake. There is not much settlement after leaving the neighbourhood of Onion lake, but the country is very open and it will be only a short time before the land is all taken up.

About ten miles before reaching Cold Lake Hudson's Bay post, which is eleven miles south of the lake itself, some settlement is again met with. There is an extensive Roman Catholic mission, a large Indian population and several settlers. In addition to the Hudson's Bay company's store, which is on the south side of Beaver river, there is another general store on the north side of the river. Between Beaver river and Cold lake, a distance of ten miles, there is a very attractive looking country.

We reached the fourth meridian on the south shore of Cold lake on March 26. Between this date and April 21, the meridian was surveyed to the north shore of Primrose lake, a body of water about ten miles north of Cold lake and not hitherto shown on any map. This was a total distance along the meridian of twenty-six and a half miles, and in addition a tie line, eight miles long, was run from the extremity of the seventeenth base line on the west shore of Cold lake to connect with the meridian. Between the two lakes the country is heavily timbered, and as I had not come prepared for the existence of Primrose lake, there was some fear, while making the survey, that we might not be able to get the line cut out through the ten miles of heavy timber between the two lakes in time to survey the meridian across Primrose lake before the ice became dangerous. However, this fear proved groundless as the ice was quite safe for ten days after we completed the line across the lake, which was accomplished on April 21. The previous winter had been very severe, the ice was three feet two inches thick on this lake and was sound up to May 1.

The summer road goes around the west shore of Cold lake and is very fair, but between this lake and Primrose lake the road is really fit only for sleighs, although a load of half a ton can be taken over it in wagons in the late summer. Even with pack horses we had a lot of trouble, and it was only the frost deep down in the ground which kept the horses from going out of sight occasionally.

There is a fairly good road following the north shore of Primrose lake. It was cut out by the Indians for a pack trail, but we widened it and bridged the streams making it passable for wagons as far as the intersection with the meridian, a distance of about six miles from where the road from Cold lake touches Primrose lake.



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Cold lake is of a fairly round shape, about twelve miles in diameter, with a total area of about ninety thousand acres. The meridian runs across it a little to the east of its centre. The shores of Cold lake are generally high and dry. There is a great deal of sandy beach, and unless along its easterly side, I do not think there is any swampy area around its shores. There is a great deal of good land around the west side and the east shore appears to be heavily timbered.

The part situated between Cold lake and Primrose lake is generally hilly and thickly timbered with poplar, birch, spruce and jackpine. The soil is generally heavy clay except on the local pine ridges where it is very sandy. Sometimes, indeed, these ridges are formed of pure sand.

Primrose lake is about forty miles long. It stretches northeast and southwest, and is divided into two parts by narrows about two miles wide. The shores around the southwesterly part are high and dry and timbered with poplar and birch with some spruce and jackpine. There are some fine stretches of sandy beach around its southwesterly extremity and the northeasterly shores of the lake are reported to be low and swampy. The area of the whole lake would probably be about one hundred and ten thousand acres, and there are at least four islands in it.

From Primrose lake to township 70, a distance of about seventeen miles, the country is generally rolling or hilly. There is a large extent of poplar-covered land and many of the low lying sections are covered with willow bushes, and have good soil. There is practically no open land over the whole district through which the meridian was surveyed last season.

Much trouble was caused by swampy land impeding the making of a pack trail for the horses, and also by the great scarcity of grass, a large proportion of the surface being covered by moss. The trail cut out by ourselves was our only means of communication with the south throughout the whole season, and it soon became cut up by the frequent passing back and forth of the horses. Towards the end of August it became absolutely impassable over a large part of its length. We were then camped forty-four miles in a straight line, and about sixty by trail, from the north side of Primrose lake and sending back men to fix the trail meant serious delay, but it became a necessity to do so.

For the first seventeen miles north of the lake we had not had any very great difficulty in finding a route in the bush for the pack trail, but north of this local swamps became very numerous. Over the first seventeen miles, ending about the middle of township 70, the country is rolling and hilly and there is a large proportion of poplar-covered land which always had a hard surface for horses, but to the north of here poplar country is very rare. The prevailing aspect, from here right to the end of the line at the north of township 80, is a series of local depressions covered with a dense growth of small spruce separated by dry sandy ridges with jackpine. Some tamarack bogs exist, but spruce and pine are very much the commonest timber.

There are no extensive and continuous areas of wet land in the whole district through which the meridian was surveyed last season. The swamps are all local and due not so much to want of general fall in the surface as to want of outlet through the numerous local ridges which enclose each wet area and form a succession of basins. In many instances swamps and bogs occur within a few hundred yards of large streams, the surface of the water in the swamps being many feet higher than in the streams, but small intervening ridges cut off the drainage.

Another of the small troubles we had was the very great distance we were from the nearest post-office. This was at Onion lake, which was ninety miles south of us when we began work in March, and when we ended in November it was two hundred and forty miles by trail from our camp. We managed to get a mail about once every three weeks; the Hudson's Bay company sent an Indian with the mail bag to the supply house on Primrose lake, a distance of one hundred and twenty miles, and I sent back one of the party to meet him there on certain fixed dates to receive the incoming mail



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and to transfer to him our own outgoing mail. With both men it meant many nights spent in the trail alone, and in some instances a considerable shortness in supplies.

During the absence of so many of the party who had been sent back to repair the pack trail, progress on the survey of the meridian was very slow, but by September 1, when they returned, we had the meridian surveyed up to the middle of township 75, a total distance run of seventy-two miles. We were now getting so far north that I had to detail half of the horses for continuous work on the trail bringing supplies from the house on Primrose lake to a second house I had built on Calder river. Although this last was only thirty miles north of Primrose lake in a straight line, it took a full week for the horses to make a round trip. Two men and eight horses were at this work continuously from September 1 to October 23, never coming into camp till the latter date, by which time we were thirty-five miles north of the most northerly of the houses, the meridian being then surveyed up to the middle of township 78, a total distance of ninety miles.

During August and September we put up about seven tons of hay cut by ourselves with a scythe, and gathered with home-made forks and rakes. Most of this was cut along Clatto river, where there are some very good stretches of grass. The grass turned colour early in September, and after September 15 it was useless to cut any more, as once it turns colour in the north there is no nourishment left in it. The grass does not cure before the frost touches it as it does in southern Alberta. Green grass first occurred about June 5, and its growth was very rapid in June. All over the north it will grow about an inch a day during the later part of June and the first half of July, but after September 15, it is practically all withered, and of very little value as feed.

As far as the middle of township 74, all the streams crossing the meridian ultimately flow back southerly to Primrose lake. North of this there are two main streams flowing northerly. These are Dillon river (Buffalo river) and its tributary Clatto river. The former rises in township 74 and flows northerly, keeping to the west of the meridian, and then crossing it to the east in township 78. It then flows northeasterly and after a course of about eighty miles empties into Buffalo lake, north of Isle a La Crosse. Clatto river, flows northerly on the east side of the meridian and joins Dillon river in the southeast of township 78, range 26. There are many beaver still on Clatto river and they were working on their dams continually all last summer. The chief tributary of Clatto river is Manny river, which comes in from the southeast and joins Clatto river in township 76, range 26.

The great divide between the waters flowing to Athabaska and Churchill rivers, that is between the watershed of Hudson bay and the Arctic ocean, crosses the meridian in the south of 78. North of here all the streams are tributary to Clearwater river which joins the Athabaska at McMurray.

North of this divide there is a very marked improvement in the quality of the soil. It is quite unlike the very sandy soil met with to the south, and is generally a heavy clay subsoil with a surface of black loam. As already mentioned there is a good deal of poplar country for the first seventeen miles north of Primrose lake. This generally has a hard clay soil. North of this section poplar is very rare, nearly all the higher lands being composed of sandy ridges with jackpine. The intermediate levels are wet but not swampy, and are covered with a dense growth of small spruce. The surface is nearly all mossy and below this moss is a depth of two to twelve inches of black soil with a subsoil of a very sandy nature, sometimes pure sand. The lowest areas in this district are very swampy and wet with about the same order of soil. The best areas over nearly all the district are the intermediate levels. They require clearing, but once cleared they will nearly all exhibit good soil.

It would appear as though the whole country was originally formed by sand. The higher parts have remained in about the same condition, the small amount of surface vegetation having been continually burnt off by fires so that the surface has only lichens and creepers growing on bare sand. The intermediate levels have been



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more protected from fire and in the course of ages decayed vegetation has had a chance to accumulate and form the black soil now lying everywhere between the sand subsoil and the mossy surface. This would be equivalent to saying that the fertile part of the soil is entirely of local origin. In the lowest depressions the lands have been so continually wet and flooded from want of outlet that surface vegetation has not grown so abundantly as in the intermediate levels. It is not probable that when drained these wet swamps would afford such good soil as the spruce lands. It may, however, be taken as a general rule that in this district from about township 71 to township 80, a large part of the dry land is too sandy for agriculture, and that while the wet land can afford good soil, it must first be drained.

Along some of the streams, notably along Clatto river and Dillon river, there is, however, another class of very good soil. It originates from the silt carried down by the water and deposited over the neighbouring lands by successive floods. In such localities the soil is of external origin; especially along Dillon river below the junction of Clatto river is this the case. The valley is here nearly a mile wide and is composed of willow bushes with large open grassy spaces. This wide valley extends at least for fifteen miles down the course of the river from the junction of Clatto river and probably right down to Buffalo lake. The same class of soil occurs, although on a much smaller scale, on Landels river, a stream which flows northwesterly through townships 78 and 79, range 1, and which ultimately empties into Athabaska river. Graham creek has very good grass along its course but it is swamp grass, the stream being too slow and its course too short for any quantity of silt to be carried down.

Except around the numerous lakes and some of the streams there is practically no grass to be found anywhere. Around the lakes sometimes swamp grass and sometimes upland grass is found. The former is much the commoner and some of the lakes have no grass at all around their shores. There is reported to be extensive areas of good slough grass all around the north shore of Primrose lake and there is plenty of the same around many of the smaller lakes, notably around two lakes occurring in township 74, range 26. As to the streams all the larger ones have at least a narrow belt of grass, enough to keep survey horses and, as already mentioned, Clatto river north of township 75 and Dillon river, have enough to allow hay to be put up. There is good upland grass along parts of Calder river and Farrier creek and around the mouth of Shaver river on the north shore of Primrose lake. Apart from the larger streams and lakes the whole district north of township 70 is generally covered with moss.

A regular line of levels was taken along the meridian, using a fourteen-inch dumpy level, from the north shore of Primrose lake which occurs in section 25, township 67, to within one mile of the twenty-first base line at the north of township 80, being a total distance of seventy-eight miles.

The idea was to ascertain only the general broad outlines of the surface and for this reason elevations were taken only at every quarter of a mile along the line. In addition, however, readings were taken on all lakes and streams. The elevation of the surface of the ground was taken at the foot of all section and quarter section posts and a bench-mark left as near each post as could be arranged. In the majority of cases these bench-marks are on trees, but where a firm rock or large boulder could be found it was always utilized instead of a tree, a broad arrow being cut on the rock with a cold chisel. A bench-mark on a tree is objectionable on account of the liability of the tree to be burnt or blown down. A second independent line of levels was run, generally in the opposite direction, as a check, although for about twelve miles at the start the system of double turning points was used. I do not favour the use of double turning points, more especially in the case of an initial meridian as the elevations of these base lines subsequently run off the meridian are wholly dependent on the accuracy of the levels taken along the meridian. The taking of levels along



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meridians and base lines is of great importance, and I believe it is well worth checking such levels by the most satisfactory method that can be found.

As mentioned already, levels were not taken between Cold lake and Primrose lake but from readings of the aneroid it would appear that Primrose lake is about one hundred and sixty feet higher than Cold lake. Martineau river, a large stream, drains Primrose lake into Cold lake. The distance in a straight line between its ends is about twenty-four miles, but measured along the bends of the river its length is much greater. I believe water-power could be developed along this river.

Primrose lake drains the whole country for about twenty-five miles to the northwest. Cold lake does not appear to have many rivers flowing into it except Martineau and Medley rivers. This lake empties into Beaver river by a stream flowing out of the extreme northeast corner of the lake.

The altitude of the surface of the water in Primrose lake, where the lines of the level were commenced, was assumed at 2,100 feet above sea-level and all elevations are referred to this as a basis.

As the meridian goes northerly from Primrose lake there is a general steady rise for thirteen miles to the north of township 69, where the elevation is 2,462 feet. After leaving the immediate vicinity of Primrose lake the lowest elevation recorded in this thirteen miles is at the crossing of Shaver river, the water of which is at an elevation of 2,176 feet. This stream flows in the valley about one hundred feet deep. Assuming its length to be about twelve miles from the meridian to its outlet on Primrose lake, this would indicate a fall of about six feet to the mile. Its current is generally swift.

North of township 69 the country along the meridian is undulating and high for about twenty-two miles to the north of section 24, township 73. In this distance the lowest elevation encountered is the crossing of Calder river in section 1, township 73, at an elevation of 2,312 feet. As this river flows easterly and then southerly to Primrose lake, after a course measured along the river of about sixty miles, it is seen that the average fall is about three and a half feet to the mile. There are many rapids in the upper part of its course, and the fall is probably much greater there and a good deal less in the last twenty miles or so before reaching Primrose lake.

To the north of the last mentioned district, that is north of section 14, township 73, there begins a very marked and rapid rise. At the end of four and a half miles this has amounted to a rise of 212 feet near the centre of section 13, township 74, where the elevation is 2,541 feet. From here there is a rapid descent, the surface being much broken, until the north of section 1, township 76, is reached, where there is a creek at an elevation as low as 2,078 feet, or twenty-two feet lower than Primrose lake, the surface falling 463 feet in the ten miles between section 13, township 74, and section 1, township 76.

From the foot of the descent just referred to at the north of section 1, township 76, the surface is very irregular, but falling steadily as a whole as the meridian goes north until the end of the survey is reached at the north of township 80 where the elevation is 1,874 feet. In this distance the highest point reached is on a sharp spur crossed in section 24, township 76, where the elevation is 2,121 feet and the lowest elevation is that of the end of the line which is 1,874 feet, or two hundred and twenty-six feet below the surface of Primrose lake.

The elevations of all the lands along the meridian south of section 1, township 76, are higher than that of the surface of Primrose lake, while north of this point the lands are all lower than this lake.

The high land occurring in township 74 forms about the northerly limit of the water flowing back southerly to Primrose lake. As, however, this lake empties into Cold lake and the latter into Beaver river, a stream which also drains the country north of this high land, this divide is really only a local one, the whole country south of township 78 being in the watershed of Churchill river.



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The great divide between the Hudson bay and the Arctic ocean crosses the meridian in section 1, township 78. North of here all the streams flow northwesterly to Athabaska river. The elevation on the meridian near this divide is 2,000 feet.

The following are the elevations of some of the more noteworthy topographical features along the fourth meridian between Primrose lake and the north of township 80:—

Feature.	Locality.				Elevation.
Primrose lake.....	Sec. 1	Tp. 68	Rg. 1		2100
Summit of land.....	" 1	" 69	"		2285
Shaver river.....	" 1	" 69	"		2176
Summit of land.....	" 36	" 69	"		2478
Surface of lake.....	" 1	" 70	"		2399
Farrier creek.....	" 13	" 70	"		2400
Surface of lake.....	" 25	" 70	"		2405
Summit of land.....	" 12	" 71	"		2472
Victor creek....	" 25	" 71	"		2397
Creek.....	" 36	" 71	"		2343
Surface of lake.....	" 12	" 72	"		2382
Summit of land.....	" 13	" 72	"		2411
Surface of lake.....	" 24	" 72	"		2359
Calder lake.....	" 1	" 73	"		2312
Summit of land.....	" 13	" 73	"		2350
Neath creek.....	" 24	" 73	"		2319
Summit of land.....	" 24	" 74	"		2564
Creek.....	" 12	" 76	"		2078
Clatto river.....	" 12	" 76	"		2075
Summit of land.....	" 24	" 76	"		2123
Surface of lake.....	" 25	" 76	"		2045
Creek.....	" 25	" 77	"		1961
Summit of land.....	" 36	" 77	"		2110
Dillon river.....	" 1	" 78	"		1960
Summit of land.....	" 24	" 78	"		2096
Creek.....	" 25	" 78	"		2009
Creek.....	" 1	" 79	"		1909
Summit of land.....	" 1	" 79	"		1960
Low land.....	" 25	" 79	"		1911
Summit of land.....	" 36	" 79	"		1970
Graham creek.....	" 1	" 80	"		1854
Summit of land.....	" 13	" 80	"		1996
End of levels....	" 25	" 80	"		1874

Perhaps one of the most notable results of taking levels along a survey line is the evidence it affords that nearly all the wet lands can be easily drained. It is generally known that very many of the swamps in the north are due more to want of outlet than to want of fall, but I do not think it would have been surmised till levels were taken, that the water in the streams was often so much below the level of the standing water in neighbouring swamps.

Of course it some times occurs that a stream will be met with flowing with full banks slowly through a swampy region doing its best to drain the surrounding land, but unable to do much on account of want of fall, but the rule is that the swamps exist because the surface water is shut in by surrounding small ridges and can not reach the lower level of the streams. A comparison of the description of the lands as shown in the field notes with the profile of the surface along the meridian will show that swamp land is nearly always at a very much higher elevation than the water in the neighbouring streams. A short ditch cut through some small ridge will often enable thousands of acres to throw off the surplus water.

Probably the impediment offered to the flow of water over the surface by moss and other obstructions has also a good deal to do with the large area of swampy land met with in a timbered country. Whatever the reason, there is little doubt that large



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areas of land, which at first sight might be thought useless, can be drained without any very great difficulty, but it would appear that such drainage should be carried out on a more general scale than can be done by separate owners of land. During the survey of the fourth meridian last season many areas of swamp land were noticed, but there were very few indeed which could not be drained with comparative ease by a well-devised system of ditches planned independently of separate ownership.

On October 8 the first snow fell, being enough to whiten the ground. On the 21st this increased to three inches, but subsequently nearly all melted off until November 6 when we had a fall of four inches. On November 10 the temperature fell suddenly to about thirty degrees below zero and winter had arrived in earnest. The line was continued on, however, although difficulties in regard to the horses and the great distance from supplies were rapidly increasing, as we all wished to get as far as the twenty-first base line, the north of township 80. Although on several occasions it looked as though we would never get so far, we finally managed to survey the line up to this base on November 22, having extended the meridian one hundred and six miles north of where we began work in March.

The next day we started homeward, but as half of the horses had left camp on November 8 to get supplies and oats from Primrose lake, now nearly one hundred miles south of us, we had to double trip for the first few days, and I was beginning to wonder how we could ever get back at such a slow rate before our supplies and oats gave out, when at last we met the packers returning. The temperature was then twenty degrees below zero and the snow fourteen inches deep; the packers had gone through a very severe trip and they were as glad to meet us as we were to see them. It saved them having to camp out, and the arrival of the additional horses with supplies and oats meant a great deal to us. This last round trip from camp to the supply house on Primrose lake had taken the packers three weeks, and as this house was itself over fifty miles from even the nearest Hudson's Bay post, one hundred and twenty miles from the nearest post-office, and one hundred and fifty miles from a railway station, some idea of the isolation of our last camp may be formed. Yet it is remarkable in how short a time settlement may follow after surveys are made. Places in other parts of Alberta where a few years ago, while surveying the preliminary lines, I used to wonder how I could keep the party from starvation, are now dotted over with settlements, and houses, post-offices, stores and hotels cover the country where there was no sign of human life within a hundred miles of our camp.



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## APPENDIX NO. 43.

## EXTRACTS FROM THE REPORT OF J. WARREN, D.L.S.

## MISCELLANEOUS SURVEYS IN SOUTHWESTERN ALBERTA.

We went easterly from Cowley to a bridge near Pincher, then along the north side of the river by the most direct trail to our work in township 14, range 2, where we arrived safely on June 2.

We proceeded with the survey of the east boundary of township 14, range 3, and completed the work in township 14, range 2, after which we proceeded to complete the survey of the easterly boundary of township 15, range 3. This work was finished on June 30, and we moved to High River to proceed with our work in the mountains. On my arrival there I received instructions directing me to make some surveys in township 20, range 4, west of the fifth meridian. We arrived at that township on July 3, and completed the required subdivision on the 13th. We left Canmore on July 20, and arriving at our camping ground on the 21st, we proceeded with the subdivision required, which we completed on September 9.

We next proceeded to Morley, having to go that way as there was no trail crossing the mountains to our work in township 20, range 5.

From Morley we went southerly along what is known as the 'Stony trail,' to the north branch of Sheep creek in township 21, range 5. From here we went west to the sixth base line which we retraced across range 5 and produced across range 6 and part of range 7.

We then resurveyed some villa lots near Calgary in section 14, township 24, range 1 which we completed on November 8.



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## APPENDIX No. 44.

## REPORT OF A. O. WHEELER, D.L.S.

## EXAMINATION OF LANDS IN THE RAILWAY BELT, BRITISH COLUMBIA.

CALGARY, ALTA., February 28, 1910

E. DEVILLE, Esq., LL.D.,  
Surveyor General, Ottawa.

SIR,—In accordance with your instructions of April 22, 1909, three sub-parties were placed in the field to continue the classification of undisposed lands, within the railway belt of British Columbia, commenced in 1908. One was in charge of M. P. Bridgland, D.L.S., another in charge of A. J. Campbell, D.L.S., and the third in charge of R. D. McCaw, D.L.S., chief assistant of my own party. In addition to the work in connection with my own sub-party, the other two were under my personal supervision and were visited from time to time to see how the classification was progressing and to ascertain the nature of the country in which they were working.

General reports of their operations by these gentlemen are attached hereto. Full detailed reports, schedules of descriptions by section, township and range, schedules of areas, tables of temperatures and lists of squatters, accompanied by maps showing in colours the various classes of land, have already been forwarded to you.

My instructions called for a division of the land examined in five classes, viz:—

(1) *Fruit land*—Comprising any land with a suitable soil for growing trees, and of low altitude

(2) *Farm land*—Comprising land which either on account of quality, altitude or other reasons is not suitable for fruit but is adapted for cultivation.

(3) *Grazing land*—Comprising land which is neither fruit nor farming land, with grass growing on it.

(4) *Timber land*—Comprising land which is neither fruit nor farming land, with timber growing upon it.

(5) *Worthless land*—Comprising land which is not fruit or farming land, with neither grass nor timber growing upon it.

It is a somewhat difficult matter to classify lands fit for fruit growing, as, in the present early stages of its culture in the railway belt, only the low-lying lands have been experimented with and climatic conditions are greatly varied. It was found by observation during the past two summers that around the larger inland lakes, such as Shuswap, Adams, Mara, Mabel, Kamloops, etc., the moderate climatic conditions evolved by the heated water surface through late September, October and November prevent, to a very considerable degree, early frosts, and that, on this account, lands surrounding them and in their vicinity are specially adapted to fruit culture and farming. Moreover, the deep beds of these lakes, resembling fjords, act as troughs to conduct moisture laden clouds and, consequently, the rainfall is sufficient without being supplemented by irrigation.

It was also observed that the climatic influences referred to extend to an altitude of about 1,200 feet above the water surface, as indicated by the height at which the warm air rising from the surface condenses and forms an overhanging cloud-belt. The altitude limit, therefore, of farming lands was set at 1,200 feet, and for fruit land at 800 feet above the surface in the vicinity of such water areas. Away from



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such climatic conditions, it is not thought that fruit can be grown successfully at nearly so great an altitude, and 400 feet above the main valley bottoms, such as those of the Shuswap, North Thompson, South Thompson and Salmon rivers, is probably the limit, although in certain cases, owing to local conditions of climate or soil, it may be grown to advantage at higher altitudes. For general farming, however, vegetables, fodder crops and, in some instances, grain for fodder purposes, can be grown at much higher altitude, reaching even as high as 1,800 or 2,000 feet above the main valley bottom. Apart from the influence of these large lakes and main waterways, particularly on the high lands of the Kamloops plateau, the lands not covered with timber are only suited for grazing, although, where it is possible to apply water by means of irrigation, they become very prolific through rapid growth and maturity in the summer months.

All the lakes named lie in deep troughs and are enclosed, for the most part, by steep rocky hillsides, clad with timber or showing nearly perpendicular rock faces. The waterways also are in narrow, or comparatively narrow valleys with sides of similar formation and, consequently, the areas suited for cultivation are very limited as compared with the whole area involved.

Not far westerly from Little Shuswap lake open grass lands begin to appear, and from there to the west end of Kamloops lake, on the north side of Thompson river, and to Kamloops on the south side, these areas of grass land become more extensive. Apparently the same class of land continues westerly towards the valleys of Thompson and Bonaparte rivers, but these points named are the farthest to which the surveys of last year were carried.

In the valley of Shuswap river and at the head of Mabel lake some areas of fruit land were located, but along that stream and in the valley of Salmon river, south to the railway belt boundary the best lands have been disposed of.

The timber found on the various classes of land is set forth in the schedule of description accompanying the detailed reports. Timber land, as defined above, is necessarily indefinite as to area. It extends all over the high lands of this section of British Columbia, and to travel over such areas for the purpose of examination would take years, owing to the difficulties of such travel and transportation. The results, moreover, would give little definite value, except with regard to quality and quantity as most of the land is beyond the zone suitable for cultivation. All the land seen, other than fruit, farm and grazing lands, was covered by timber that reached to the summit of the high lands. In the grass land belt most of the summits are timbered and no worthless land, as defined above, was noticed, except in small patches, and then only in the form of rock steeps and precipices, which cannot well be shown on a small scale map, owing to their being nearly vertical.

The detailed reports and schedules of description of individual parcels of land in conjunction with the maps accompanying them, deal fully with the classification of the undisposed lands in the section of the railway belt covered by the examination.

As a datum for altitudes, the average elevations of the respective water surfaces of the several lakes above sea-level were used. Where such a datum was not available the elevations are referred to the main waterways traversing the respective areas of lands classified. A list of the datum levels used will be found attached to each map.

Mr. Bridgland first completed the examination of the Columbia river valley from Donald to Beavermouth and down that valley to the railway belt limit. There is a narrow area of farming land along the river, chiefly on the west side, and a larger area near the belt line. For the most part the lower land is flooded and has been classed as grazing land. If suitable drainage could be applied, it is likely a lot of the flooded land could be reclaimed as farm land. There is no access yet by road to this portion of the valley and navigation is prevented during low water by rapids. At high water navigation would be possible, but would be expensive, owing to the swift current.



It is thought that none of this land is suitable for fruit growing as, owing to the early and heavy snowfall, there is an advanced winter and a late spring; the late spring frosts, moreover, combined with the hot sunshine of the middle day, have a very injurious effect upon the trees, because when the sap commences to flow during the day and then freezes at night, it causes the bark to peel, ultimately killing the trees. These conditions have been observed at Golden, twenty-eight miles up the valley from Beaver-mouth.

Mr. Bridgland also, while here, made an examination up Beaver river valley as far as Mountain creek, but, practically, with no results. He next examined the Shuswap valley to Mabel lake and north of that lake up the valley of Frog creek. Thence, moving westward, he covered the ground lying between the railway belt boundary, Shuswap lake and South Thompson river, and the west boundary of range 12, west of the sixth meridian. His maps, detailed report and schedule of descriptions show full particulars.

Mr. Campbell joined his party on June 17. The party commenced work in the valleys of Tonkawatla and Eagle rivers on May 23, Mr. McCaw taking charge of the examination until Mr. Campbell's arrival. Nothing of any account was located until well down Eagle river valley, when some fruit and farm lands were classified. The special climatic conditions surrounding Shuswap lake extend for a considerable distance up this valley and should enable fruit to be grown to advantage. In the upper reaches it is thought the early heavy snowfalls will create conditions prohibitive to successful agriculture. The valley is narrow and the area limited.

On completing the examination of Eagle river, Mr. Campbell transferred his party to Shuswap and examined all the territory bounded on the east by the west boundary of range 12, on the south by the railway belt boundary, on the west by the west boundaries of townships 17, 18 and 19, ranges 18, 17 and 16 respectively, and on the north by South Thompson river. Full particulars are shown by his maps, detailed reports and schedules of descriptions.

The third party, in charge of myself and Mr. McCaw, made the examination of the territory north of the Canadian Pacific railway, and within the railway belt boundary, as far west as the valley of Deadman river, which joins the South Thompson a short distance below Kamloops lake. Work was commenced at Blind bay on Shuswap lake, where it had been discontinued the season before. It was now carried up the valleys of Scotch creek and Adams lake, and westerly as stated. During the summer this party was divided into two, and one section of it made an examination of lands on Adams lake and Salmon arm of Shuswap lake. This was done in order not to delay the progress westward by the withdrawal of the full party to make the examination in these isolated parts. It had been found earlier in the summer, while the party was working in the vicinity, that the water of Adams lake was too high to enable surveys to be advantageously made to locate the lands classified. Detailed information will be found in the reports and maps already submitted.

On these maps are shown by several colours the respective areas classified. To each map is attached a statement of the datum levels from which the altitudes given in the schedules of description are computed; and also of the areas of the various classes shown by colours on the said maps.

Generally it may be said that the fruit and farm lands are found in and along the sides of the valleys, and that the highlands are, for the most part, grazing and timber areas. This will account for the relatively small area of land suitable for cultivation as compared with the total area that has been examined.

The following is a summary of land classified by all the parties:—

	Acres.
Total area classed as fruit land . . . . .	60,748
Probable area fit for cultivation . . . . .	43,248
Total area classed as farming land . . . . .	97,391
Probable area fit for cultivation . . . . .	59,509
Total area classed as grazing land . . . . .	243,124



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By far the largest portion of the remainder of the area involved is land covered by timber, and what then remains is water surface and worthless land, the latter rock exposures and land at too great an altitude to be accessible.

I have the honour to be, sir,  
Your obedient servant,

ARTHUR O. WHEELER, D.L.S.

EXTRACTS FROM THE REPORT OF M. P. BRIDGLAND, D.L.S., ON THE  
EXAMINATION OF LANDS IN COLUMBIA RIVER VALLEY.

Camp was pitched on Bush river about one mile from its mouth, where it remained till June 15. During this period all the land here was examined, light camps being taken out to the more distant sections. A compass and stadia traverse was made of Cygnus lakes, of about thirteen miles of Bush river and of four miles of Gold creek, and these traverses were connected with the nearest survey posts. The traverse was for the purpose of locating the lands examined. The party then started back examining the lands on both sides of the Columbia and reached Beavermouth on June 23.

The last days of June were spent in looking over the benches between Donald and Beavermouth and in Beaver valley. There was very little land here of any agricultural value, so not much time was spent over the work.

On July 1 the whole party moved by train to Sicamous Junction and at once started to examine the lands in the vicinity of Mara lake and Shuswap river. From then to July 29 we worked in the valley between Sicamous and Enderby. Very little land of any value was found on the east side, but on the west in township 20, range 8, and townships 19 and 20, range 9, there is a considerable area of rolling land 1,000 to 1,200 feet above the river, much of which is probably suitable for settlement. In township 18, range 9, there is some land above Enderby, but it is not suitable for cultivation though of some use as grazing or timber land. Considerable good land was found here lying chiefly on the south side of the river. Most of it is well timbered and all is included in timber berths 237 and 238.

From August 26 to September 26 was spent looking over the land around Mabel lake. While here a stadia traverse was made of that portion of the lake lying within the railway belt, and one week was spent on a trip up Frog creek. The shores of Mabel lake are steep and rocky and not suitable for cultivation, but there is considerable good land, probably about three thousand three hundred acres in the valley of Frog creek in townships 20 and 21, range 5.

On October 1 camp was moved from Enderby to Deep creek valley. Twelve days were spent in the valleys of Deep creek and Canoe creek, and on October 12 camp was moved down to township 17, range 10, where there is some land still untaken on a high bench to the west of Armstrong, some of which may be of use for farming.

On October 15 the examination of lands along the Salmon river valley above Glenemma was commenced. Very little land suitable for cultivation was found, but in township 17, range 11, township 18, range 12, and the southwest corner of township 19, range 12, many slopes, principally those facing south, were found to be suitable for grazing. Most of the slopes facing north were covered with thick underbrush. This part of the work was completed on October 28.

The next day work was started below Glenemma, and we were engaged till November 10 examining the lands along the Salmon river branch of Shuswap lake. On the east side of Salmon river in township 18, range 19, there is very little land of any use except for grazing, but on the west, in township 18, there is considerable good land.



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The remainder of the season was spent working west through townships 21, ranges 10, 11 and 12, to Shuswap along the valley of Tappen creek. Considerable land suitable for cultivation was found in these sections and much rough partially timbered land which would be of some value for grazing. The valley of Chase creek in township 20, range 12, was also examined, but very little good land was found.

#### EXTRACTS FROM THE REPORT OF A. J. CAMPBELL, D.L.S.

##### ON THE EXAMINATION OF LANDS IN EAGLE RIVER VALLEY AND SOUTH OF THOMPSON RIVER.

My first work was to examine and classify the lands in the Eagle river valley; this was completed July 19. Owing to the thickness of the bush, the number of swamps, and the frequent crossings of the river, the work was not completed in this section as soon as expected.

After completing the work in the vicinity of Sicamous, a move was made to Shuswap on July 20. The examination of lands lying west of range 12 and between South Thompson river and the southerly limit of the railway belt was then commenced.

From July 20 until August 20 the lands adjacent to South Thompson river in range 13 were examined, also the lands in a small valley to the east of Martin mountain down to the valley of Bolean creek, up this valley to its head, and over the divide down the valley of Paxton creek to Summit or Monte lake.

From August 20 until September 6, the lands in the vicinity of Summit lake in range 14, and those in the valley of Salmon river in ranges 13 and 14, to the boundary of Monte Hills forest reserve were examined.

From September 6 to September 24, the work was carried on in the valley of Monte creek and along South Thompson river in ranges 14 and 15. During this period considerable wet weather was experienced which delayed the work to some extent.

From September 24 to October 23, we examined the lands in the upper valley of Robbins creek in range 15, and those in the vicinity of Campbell lake in range 16, also those adjacent to Campbell creek in the same range. On October 23 camp was moved to Trapp lake, and from then until November 25 the work was carried on in the vicinity of Trapp, Napier and Shumway lakes in ranges 16, 17 and 18.

#### EXTRACTS FROM THE REPORT OF R. D. McCAW, D.L.S.

##### ON THE EXAMINATION OF LANDS NORTH OF SOUTH THOMPSON RIVER.

From May 22 until June 17, I was engaged upon the examination of lands between Revelstoke and Taft, in the vicinity of the Canadian Pacific railway. Camp was moved to Taft on June 12. A short compass traverse was run south from Three Valley lake in the South Pass valley.

Work was then commenced along Adams river and carried north to the south end of Adams lake, including lands north of Little Shuswap lake. Work was continued westerly along South Thompson river on the north side, and between that river and the Niskonlith forest reserve. Kamloops Indian reserve was reached on July 26 and on the 27th camp was moved to a point opposite the town of Kamloops.

Work was then proceeded with along the north shore of Kamloops lake and in close proximity to the lake until Savonas was reached on August 30. Camp was then moved back to a place opposite Tranquille where the boats were stored until needed. From Savonas we moved camp northerly to lac DuBois, and the work was carried easterly towards North Thompson river.



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North Thompson valley was the next base of operations. Work was carried north to the limit of the railway belt on the west side of the river, and then south on the east side of that river to Hefferly creek, which was reached on September 28. During the latter part of September we were hindered on account of heavy rains.

The work was now carried east into the valley of Louis creek, where bad weather was again experienced for a few days. Before returning to North Thompson river the lands lying west of the Niskonlith forest reserve were examined, as far as the steep slope to that river. On October 20, camp was moved down to North Thompson river and the remaining land between Hefferly creek and the Kamloops Indian reserve examined.

During the remainder of the season operations were carried on north of Kamloops lake along Tranquille river, Copper creek, in the Red lakes district, and along Deadman river to the east limit of township 23, range 22, where work was completed for the season.



## APPENDIX No. 45.

## EXTRACTS FROM THE REPORT OF W. H. YOUNG, D.L.S.

## RESURVEYS IN SOUTHERN ALBERTA.

I moved to Stirling following the Alberta Railway and Irrigation company's line and a very good, though rough, trail which leads from there along the north side of Etzikom coulée to township 6, range 17, west of the 4th meridian. I retraced all lines in townships 6 and 7 which had not been previously retraced.

My next work was to retrace all lines in township 7, range 1, west of the fifth meridian, and to traverse both banks of Crowsnest, Southfork and Oldman rivers within the township.

On account of the high water, I was greatly retarded in the work, more especially in the traverse, and it was impossible to ford any of these rivers till the survey was almost complete. The northeast corner is cut off from the rest of the township by the north fork of Oldman river, with no bridge for miles. However, owing to the kindness of Mr. Hugh Ritchie, who was employed gauging rivers in southern Alberta, all were enabled to cross on his cable and car.

After completing the work in this township, I moved up Southfork river to survey certain lines in townships 6 and 7, range 4. These townships are extremely rough and mountainous. The south boundary of township 6 is heavily timbered, and also the west boundaries of both townships; in fact a number of timber berths cover a portion of these townships.

Fires have done a great amount of damage in the western sections, but many of the dead trees are still quite sound. West and south of the burned area extensive forests of spruce and pine are still growing. Even if these townships were cleared the sections where the good soil is will never be of use for agriculture as there is a very severe frost in all months of the year. A very good trail follows along Southfork river to township 6, range 4, but it can be travelled only after the middle of July, when the water is low. The trail along the north side is very rough and hilly and so is not a desirable road to follow. The main trail follows the river south, and has been graded on the hillsides and at the river crossings, as far as section 34, township 5, range 4, where a company was preparing to bore for oil. In section 12, township 6, at the mouth of Link creek, a graded trail now leads to a coal mine opened during the past summer in section 15.

After finishing the work in this township I moved through Frank and Blairmore to section 23, township 7. On completing the work in the eastern part of the township and a few miles in the west, I was forced to cease operations on account of the deep snow and stormy weather.



PLATE I.



Sorcerer Mt.

Photo by P. A. Carson, D.L.S.

PLATE II.



Sunbeam Lake.

Photo by P. A. Carson, D.L.S.









Caribou on Mt. Sentry.

Photo by P. A. Carson, D.L.S.



Mt. Sir Sandford (11,600 feet).

Photo by P. A. Carson, D.L.S.









Valley of Hay River.

Photo by A. H. Hawkins, D.L.S.



Photo by A. H. Hawkins, D.L.S.  
Roche Miette and Fiddle Creek Range.









Photo by H. S. Holcroft, D.L.S.  
Moose Creek, Government Repair Station.



Battle River Valley. Photo by H. S. Holcroft, D.L.S.







PLATE IX.



Battle River Valley. Photo by H. S. Holcroft, D.L.S.

PLATE X.



Dried Meat Lake on Battle River. Photo by H. S. Holcroft, D.L.S.









Photo by H. S. Holcroft, D.L.S.  
Zaczouskis Coal Mine, near Wanda.

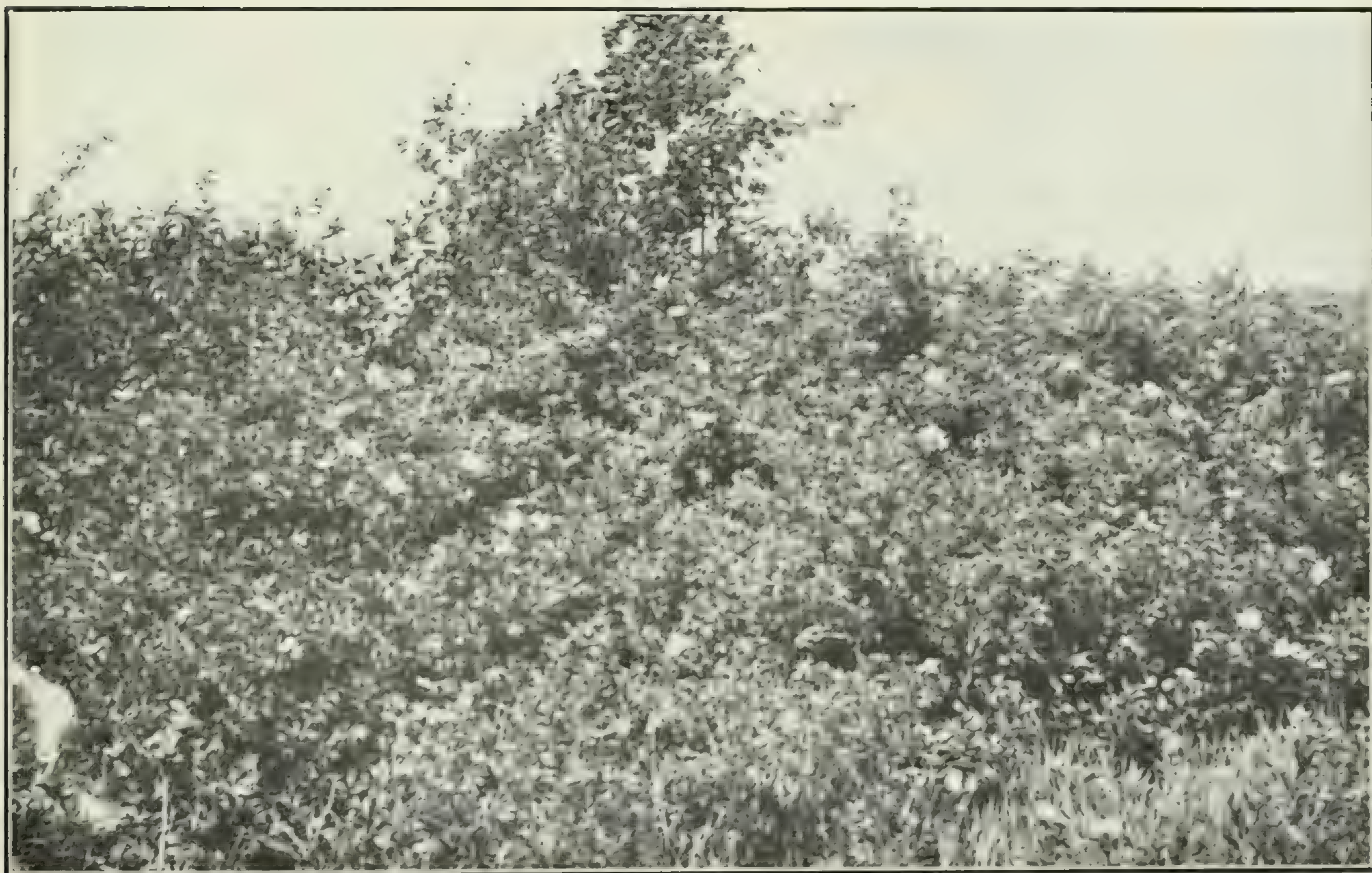


Photo by H. S. Holcroft, D.L.S.  
Bed of Wild Roses in Battle River Valley.









A "butte" in Battle River Valley. Photo by H. S. Holcroft, D.L.S.



Dam on Adams River. Photo by J. E. Ross, D.L.S.









Foot of Canyon on Adams River.

Photo by J. E. Ross, D.L.S.



Head of Canyon on Adams River.

Photo by J. E. Ross, D.L.S.







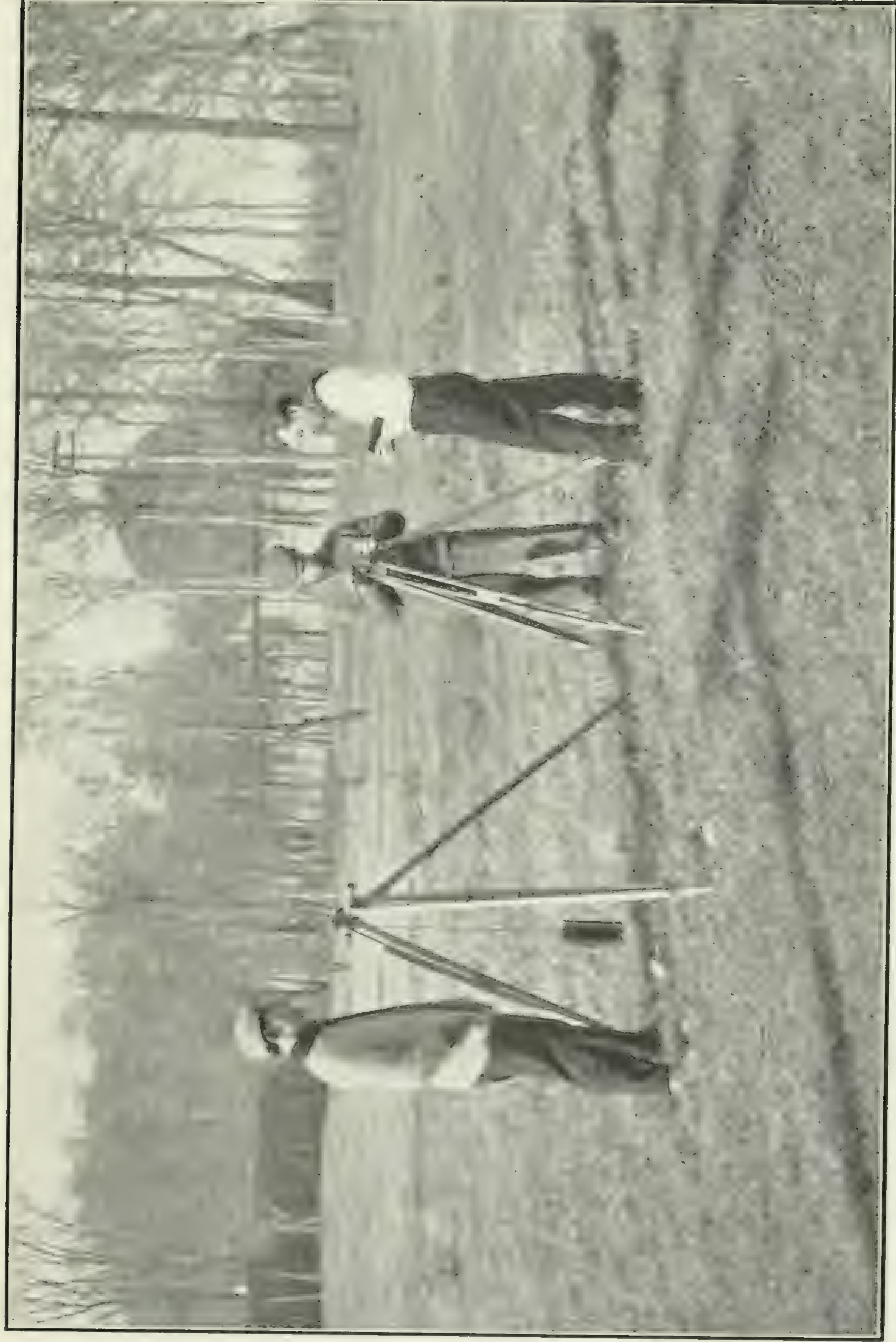


The Invar Base Line Instrument.









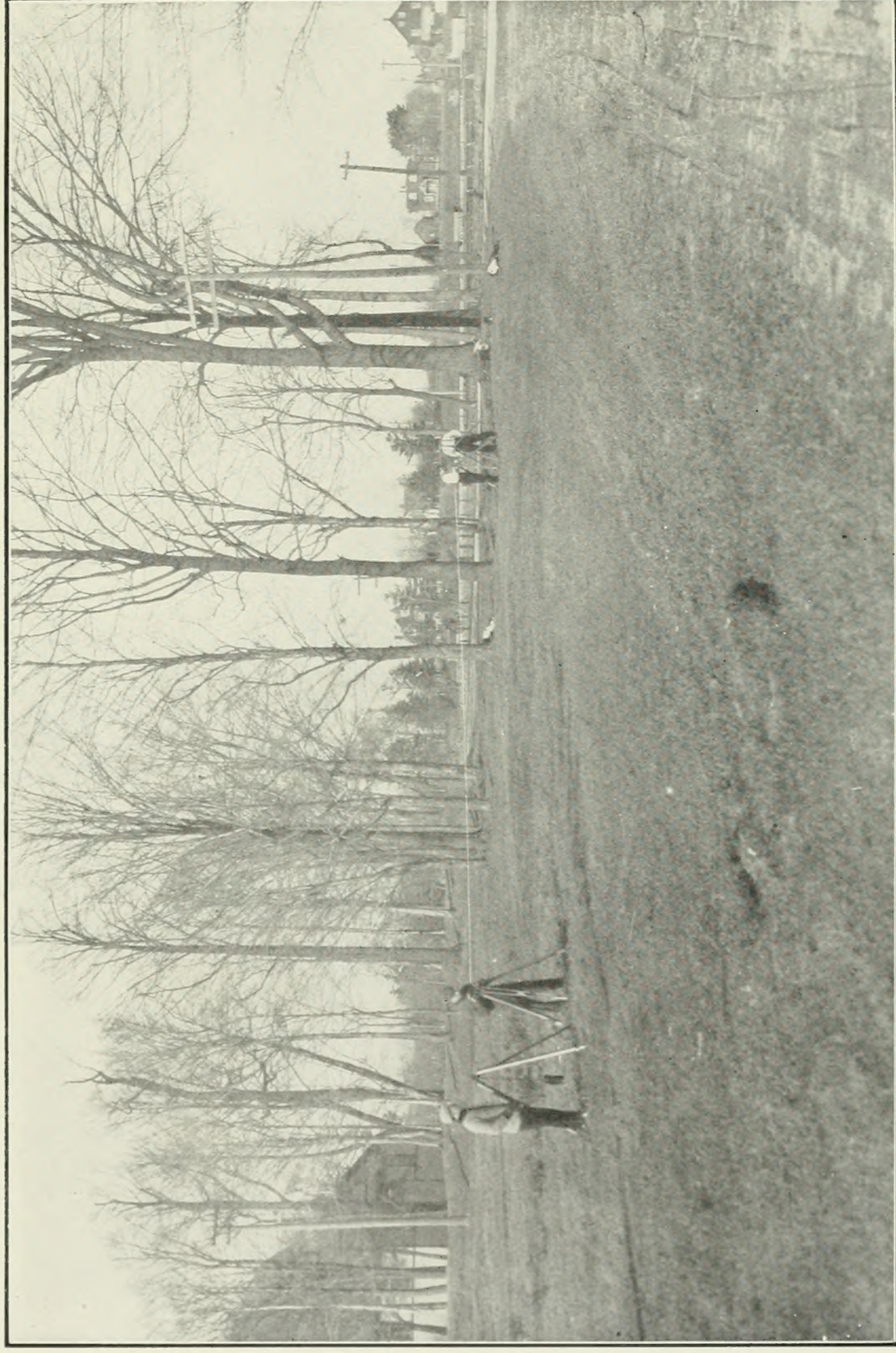
Taking readings on the Invar Base Line Instrument.







PLATE XIX.



The Invar Base Line.











